REGION ONE PROTOCOL EFFORT

2024 – R.O.P.E Guidelines

THE STANDARD OF CARE FOR EMS PROVIDERS IN THE GREATER NEW ORLEANS AREA

REVISED MARCH 2024

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Region One Protocol Effort

Region One includes four parishes in the southeast part of Louisiana: Orleans, Saint Bernard, Plaquemines, and Jefferson parishes. The primary 911 providers of each parish within Region One are:

Orleans:	New Orleans EMS
Saint Bernard:	Acadian Ambulance Services of New Orleans
Plaquemines:	Plaquemines Parish EMS
Jefferson:	East Jefferson EMS and West Jefferson EMS, respectively Westwego EMS and Gretna EMS, within their incorporated boundaries

Clinicians within the region collaborated to provide the following standing orders[1] and offline medical direction. In addition to EM and EMS expertise, primary references include NASEMSO National Model EMS Clinical Guidelines, peer-reviewed journals, local specialist physicians, and extensive review of outside EMS agencies (special thanks to Denver Metro EMS, East Baton Rouge EMS, and Austin Travis County EMS!) These orders reflect up to date, evidence based, standard of care for prehospital medicine and have been approved by local EMS medical directors within the Region One Metropolitan Ambulance Council (MAC) Clinical Committee.

Members of the Region One MAC Clinical Committee include:

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Any EMT or paramedic certified to provide prehospital care within the parishes of Region One must adhere to these orders. In accordance with Louisiana Administrative Code, Title 48, these revised guidelines shall supersede all guidelines currently in use within any EMS system – public or private – licensed to operate in Region One. The use of any other protocols/orders/guidelines specifically developed for an individual EMS system is strictly prohibited. It is recommended that EMS agencies routinely conduct quality assurance and that the MAC Clinical Committee meet regularly to evaluate the effectiveness of these guidelines to ensure providers maintain the highest quality prehospital patient care.

ROPE guidelines should never overshadow sound clinical judgment of prehospital providers.

[1] Defined as "protocols" by the Louisiana Administrative Code

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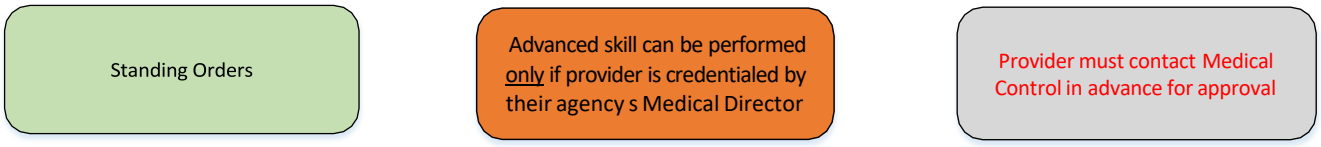
ROPE Introduction

All licensed EMS practitioners are expected to provide prehospital care under the direction of the highest skilled level EMS practitioner and Medical Control. This may be accomplished by voice communication established with a physician and under the physician's order or through utilization of standing order outlined in an approved protocol.

Standing Orders

Standing orders are designed for EMS providers to initiate care without having to contact Medical Control. Additionally, certain treatments and procedures must be credentialed by the agency's Medical Director before they can be performed within Region One. Education, training, and medical oversight for these advanced skills is the responsibility of the agency's Medical Director.

The following colors are utilized within the ROPE guidelines to clarify provider orders:



Additional colors utilized within the ROPE guidelines include:

Medical Control

Online medical control – via radio or telephone – can be used whenever desired by the EMT or paramedic. When contacting Medical Control, providers should begin their report stating the reason or request for which they are calling. The provider report should then follow the format outlined in the appendix.

Listed below are reasons for which Medical Control **MUST** be contacted:

- as clinically indicated and in accordance with the operating procedures of your employer
- as indicated in the On-Scene Physician policy
- at any point as directed within the following ROPE guidelines
- prior to administration of medications that are not standing orders
- if a line of treatment is in question or patient care becomes unclear
- prior to performance of an advanced skill(s) as specifically stated in the appropriate guideline
- to request/receive orders to terminate, or not attempt resuscitation.

In the event that primary Medical Control cannot be reached, the responsibility of Medical Control will belong to either the receiving facility or the agency's EMS Medical Director. Physicians serving as Medical Control are expected to be familiar with ROPE guidelines and to use them as a guide for providing prehospital orders and/or consultation.

A Medical Control physician should notify an agency's EMS director in writing or by email whenever prehospital care has been rendered that they believe does not comply with the guidelines as outlined by ROPE. They may also notify the Region One MAC if there are guidelines that a Medical Control physician needs to be revised in order to maintain quality prehospital patient care.

On-Scene Physician

If a licensed physician other than an agency's EMS medical director is first to arrive on-scene of an emergency, protection from liability applies as outlined in the Good Samaritan Statute[1]. Upon arrival of the EMS practitioner, the physician has three options:

a) *Allow the EMS practitioner to assume full authority for directing the care of the patient.* In this instance, the physician will not have any risks of liability for patient abandonment.

b) *Assist the EMS practitioner in the care of the patient without assuming authority over patient care.* In this instance the EMS practitioner must articulate that state law requires EMS personnel to comply with standing orders and/or verbal orders from a pre-established Medical Control.

c) *Assume full authority for directing patient care*. The primary purpose of this option is to support a previously well-established physician-patient relationship; however, it may be utilized under other less anticipated circumstances. In this instance, the physician must state their intent to assume responsibility for any patient care given and must accompany the patient to the hospital. EMS providers should manage this situation based on the following process.

Process for On-Scene Physician Assuming Patient Care

1. The EMS practitioner should ask the physician to show his/her Louisiana State Board of Medical Examiners license as verification of his/her identity as a physician.
2. The EMS practitioner should confirm (and reaffirm) that the on-scene physician is agreeing to:
    a. Full medicolegal responsibility of patient care
    b. Remain physically present during the duration of prehospital care, including riding in the back of the ambulance with patient and performing handoff to a clinician at the receiving facility.
    c. Sign the EMS patient care report (i.e. prehospital medical record) indicating that they have accepted full responsibility for medical care and all medical orders given.
3. The EMS practitioner should establish contact with the base hospital physician serving as Medical Control. After advising the Medical Control Physician (MCP) of useful patient information, the EMS practitioner should inform them that a physician is present and wishing to assume patient care responsibility. The on-scene and Medical Control physician should discuss the appropriate patient treatment and determine who will have authority over patient care.
4. EMS personnel will accept orders from the on-scene physician only after the base hospital physician serving as Medical Control has stated that care is being transferred to the on-scene physician. EMS practitioners may only execute orders and perform duties that are within their scope of practice.
5. If at any time the on-scene physician's orders become questionable, are contrary to established Region One protocols, or appear to interfere with quality patient care, the EMS practitioner should.

[1] Louisiana State Legislature RS 37:1731. http://legis.la.gov/legis/Law.aspx?d=93432

immediately re-establish contact with the base hospital physician for guidance before executing the orders. In any case of conflict, the orders of the online Medical Control physician take priority.

EMS practitioners shall treat all on-scene physicians with respect and shall endeavor to work in cooperation with an on-scene physician for the patient's best interest. The EMS practitioners should make their services, equipment, supplies and ambulance available to the on-scene physician as much as feasible.

Patient Refusal of On-Scene Physician Care

In the event that a patient refused the care of the on-scene physician but accepts the care of the EMS practitioner, the online Medical Control physician will be responsible for directing the EMS practitioner, regardless of whom the two physicians originally decided would have patient care authority.

A patient (or a patient/guardian, in the case of a minor) who is lucid and understands the medical risks and consequences of their decisions has the legal right to refuse care by the EMS practitioner, on-scene physician, and Medical Control physician after such risks and consequences have been explained to him/her.

In the event that a patient wishes for the on-scene physician to have authority over care, but the online Medical Control physician does not feel that this is in the patient's best interest, the EMS team on-scene should attempt to have the patient sign a refusal of service form before leaving the scene (as is standard practice). The on-scene physician is then responsible for further patient care and for arranging transport of the patient to an appropriate hospital or facility.

Provider Responsibilities

EMS practitioners are authorized to perform services, treatments, and procedures authorized by ROPE and within the provider's Louisiana Bureau of EMS scope of practice matrix guidelines to the extent that he/she has been trained to perform such services. EMS agencies are responsible for module education and documentation of skill proficiency and education. All skills, procedures, interventions, and medications must be included in agency protocols as approved by the agency's medical director. Ambulance services are responsible for ensuring compliance with applicable protocols by their personnel.

In the event of a basic level ambulance response to an emergency within Region One (prohibited in Orleans parish unless an MCI or disaster is declared) EMRs, EMTs and Advanced EMTs are permitted to administer the medications as specified within this document that are also in accordance with the Louisiana Bureau of EMS approved scope of practice matrix for licensed EMS practitioners.

The scope of practice for each EMS practitioner level is determined by the LA EMS Certification Commission. The most up to date matrix is available at https://ldh.la.gov/index.cfm/page/1754.

Ambulance Requirements

Patients in the need of transport to a hospital will be transported in an ambulance or an approved vehicle that meets the requirements of the regulatory agencies of Region One and the state of Louisiana.

In addition to state requirements, Region One mandates all EMS services and systems licensed to operate in the region carry the following equipment:

- 12-lead EKG
- AED (Automatic External Defibrillator); biphasic (for BLS units)

- All medications listed within these guidelines, unless stated “if available”
- Biphasic defibrillation
- Quantitative end tidal CO_2 ($EtCO_2$) capnography
- Glucometer
- Intraosseous vascular access (adult and pediatric)
- SpO2
- Transcutaneous pacing
- Continuous Positive Airway Pressure (CPAP)

Operating without the above equipment violates certain parish ordinances and could jeopardize licensure.

Hospital Selection

1. The choice of hospital destination should preferentially be based on the patient’s medical need. If, in the opinion of the highest skilled level EMS practitioner or Medical Control, the patient’s condition is unstable the patient will be transported to the closest appropriate hospital emergency department.

2. In patients who are stable, hospital diversion should next be considered by EMS practitioners when choosing hospital destination. Providers should maintain awareness of local hospital status and encourage local ED staff to regularly update hospital status within the LERN ESF-8 Portal. Providers may be required to override hospital diversion to transport patients to facilities with specialized patient care capabilities (e.g. trauma, stroke, STEMI).

3. In stable patients where hospital diversion is not a factor, patients (or an authorized guardian) will be allowed to select the hospital destination of choice within the EMS service area. EMS providers should consider factors such as travel time and weather when determining hospital destination and make selections in the patient’s best interest. If a patient’s hospital choice cannot be honored, providers should make every effort to transport the patient to a hospital within their preferred healthcare system. Hospital destination should not be determined by a provider’s unsubstantiated perception of hospital capability.

4. Patients who have sustained rabid animal bites, venomous snake bites, or any other poisonous bites or stings should be transported to an ED that has antivenin and rabies treatment. Providers should contact Medical Control for assistance identifying the appropriate receiving ED.

Hospital Diversion

Region One providers will make every attempt to honor hospital diversion and acknowledge patient off-load times of receiving facilities. A diversion request usually means the hospital’s current patient load exceeds the ED’s ability to treat additional patients promptly. If one ED is overcrowded and another is available, diversion helps ensure that a patient is treated in a timely manner.

Diversion status indicates an area of the hospital (e.g. ICU, psychiatric) is without further available resources. This may include “ED Saturation.” EMS providers should make every effort possible to avoid transporting patients to hospitals on ED saturation. Limited Diversion Status does not apply to patients who are critically ill requiring immediate stabilization.

The dispatch centers of all Region One EMS providers will monitor the LERN ESF-8 portal and update on-duty crews of hospital diversion status, color (as outlined below), and off-load times. If approved by the individual agency, EMS providers may also access the portal and review off-load times themselves. Posting current and updated information is the hospital's responsibility.

Hospital's approximate off-load times correspond to the following colors listed on the LERN portal:

Green	→	**off-load times less than 15 minutes**
Yellow	→	**off-load times of 15 – 30 minutes**
Red	→	**off-load times of 30 – 60 minutes**
Black	→	**off-load times of greater than 60 minutes**
Purple	→	**off load times greater than 120 minutes**

Patient/Call Disposition

All 911 calls received by EMS will be given one of the following dispositions:

1. Cancelled prior to arrival on scene
   - This disposition is provided by the Communications Center (i.e. dispatch).
   - Dispatcher must obtain a name of the canceling party, documenting it on a recorded line as they relay the name to the EMS crew for agency-specific documentation.
2. Unfounded
   - This is reserved for instances when an EMS crew (or first responding agency) arrives at a location and is unable to locate a patient. Every attempt will be made by the responding crew to locate the patient.
3. Patient "Gone on Arrival" (GOA)
   - This is reserved for instances when an EMS crew (or first responding agency) arrives on a scene and a bystander reports that the patient has left the scene.
   - Every effort should be made to obtain information regarding how and when the patient left and the party relaying that the patient is gone should be documented over the radio.
4. Cancelled on Scene
   - This is reserved for when an EMS unit arrives on the scene of a 911 call and finds **an individual with no injuries, no complaints, and no request(s) for medical assistance.**
   - Should the medic render ANY type of assessment or treatment, this disposition should not be utilized. This disposition generally does not apply if a unit is on scene for an extended period of time.
   - EMS providers must obtain the name of the canceling party (whether it is law enforcement, fire department or the people involved in the incident).
5. Patient Refusal
   - This is reserved for a low acuity call in which neither the patient/guardian nor the provider feels that the patient's condition warrants transport via an ambulance.
   - It is recommended that providers obtain a patient refusal – not "cancelled on scene" disposition – when choosing not to care for individuals involved in trauma with a concerning mechanism of injury.

- A patient refusal on a patient care report will be signed by the patient/guardian and witnessed by another party on the scene. Providers should seek to obtain witness signature from an individual accompanying the patient or a first responder from an outside agency (e.g. police, fire).
- Providers may obtain the signature of their EMS partner as a last resort if no third party is present.

6. Patient AMA
   - This is reserved for a more acute call in which the provider believes – based on their clinical assessment – that the patient needs EMS treatment and transport, yet the patient/guardian is declining treatment and transport.
   - AMA requires consultation with online Medical Control or the Medical Director of the responding agency.
   - AMA requires refusal on a patient care report and signature by patient and witness as described above.
   - Providers may offer and provide stabilizing care to the patient on-scene prior to completing the call.
7. Patient Deceased on Scene
   - Death may be medical or traumatic in etiology; providers should follow the appropriate clinical guideline.
   - Providers must contact Medical Control to obtain orders to withhold or terminate resuscitation.
   - Providers must report the Time of Termination (TOT) in the patient care report.
   - Local law enforcement and/or the parish Coroner's Office must be contacted.
8. EMNAT "Emergency Medical Necessary Action Taken"
   - This is reserved for when an EMS crew evaluates and/or treats a patient according to a special event protocol (e.g. road race, concert venue) or during a mobile integrated healthcare encounter.
   - The patient is evaluated, treated, and released with appropriate follow up instructions.
   - Providers must document the patient encounter based on the policies of their local agency.
9. Patient Transported to an appropriate ED or pre-established alternate destination of care.

Regional Mass Casualty Response

For any mass casualty incident (MCI) within Region One, the primary 911 provider for the parish in which the incident occurred is expected to serve as lead EMS agency and assume control of the incident upon their arrival. The National Incident Management System (NIMS) will be utilized to manage all MCI events.

Any non-lead EMS agency present on-scene will defer to the leadership of the primary 911 provider – this includes relinquishing command/control of the incident to a representative of equal or higher skill level within the lead EMS agency.

It is the responsibility of the highest skilled provider within the lead agency to serve as Incident Commander (or designate another incident commander) and to request additional resources as needed. Additional EMS agencies may provide mutual aid as designated/requested by the Incident Commander.

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Region One Protocol Effort

Medical Guidelines

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Medical Preambles

The following general principles should be practiced while operating within Region One. These principles serve as a reference to be used in conjunction with each disease-specific guideline. When a clinical situation is not specifically addressed in a guideline, providers should refer to the basics of prehospital medicine, utilizing the skills of assessment and treatment appropriate for their level of training. Medical Control should be considered a resource for consultation when mandated and as needed.

- As scene safety and scene conditions allow, a *primary* survey, routine medical care, and initial treatment should be completed **prior to moving the patient to the ambulance.** The performance of the *secondary* survey should not delay transport in critical patients.

- High-visibility, retro-reflective apparel should be worn when deemed appropriate (e.g. operations at night, in darkness, in large crowds, on or near roadways)

- Appropriate personal protective equipment (PPE) should be always worn by EMS providers during patient care.

I. UNIVERSAL CARE

- All patients should have vital signs assessed upon patient contact or as soon as reasonably possible. Region One recognizes vital signs as:
    - blood pressure (+ capillary refill in children)
    - heart rate
    - respiratory rate
    - SpO_2
    - GCS or AVPU (**Al**ert, **V**erbal, **P**ainful, **U**nresponsive)
    - pain scale
    - temperature (where indicated)

- At least two full sets of vital signs should be documented for every patient. Ideally, one set should be taken shortly before arrival at the receiving facility. Critical patients should have pertinent vital signs monitored more frequently.
- Abnormal vital signs should be addressed and reassessed.
- Response to therapy provided should be documented, including pain scale reassessment if appropriate.
- Upon administration of any medication, patients should ideally have IV access, cardiac monitoring, and pulse oximetry measurement with O_2 as indicated.
- Following administration of medications via IV/IO access, providers should flush the line with saline fluid bolus. Give 20ml of NS following medication given during cardiac arrest; give a 10ml NS flush following IV/IO medication administered at all other times.
- When medication, including a fluid bolus, are not required, or anticipated saline locks may be used at the paramedic's discretion.
- Medication administration via the endotracheal tube is strongly discouraged and should only be utilized with Medical Control authorization.

Patient Assessment

PQRST History

- **O** Onset of symptoms
- **P** Provocation (location of symptom; any exacerbating or alleviating factors)
- **Q** Quality of pain (sharp, dull, stabbing, pressure, etc)
- **R** Radiation of pain (is it localized in one area or does it spread)
- **S** Severity of symptoms (pain scale)
- **T** Time of onset of symptoms and circumstances around onset

SAMPLE History

- **S** Signs and symptoms including pain
- **A** Allergies
- **M** Medications prescribed and medications taken prior to arrival
- **P** Past medical history
- **L** Last oral intake
- **E** Events leading to injury or illness {Mechanism of Injury, (MOI)}

Signs and Symptoms should support the provider impressions, treatment guidelines and overall care given.

- A symptom is something the patient experiences and tells the provider; it is subjective.
- A sign is something the provider sees; it is objective.

Symptoms should not be confused with provider impressions. The provider impressions are the EMS working field diagnosis of the patient's actual medical condition. Provider impressions should be supported by symptoms but not be the symptoms except on rare occasions where they may be the same (e.g. weakness when no etiology for the weakness can be determined by the EMS provider).

In accessing pain severity, the provider should first attempt to obtain a reported value between 1-10 directly from the patient. If the patient is unable to provide a value for any reason, Wong-Baker Faces Pain Rating Scale can be utilized.

Wong-Baker FACES Pain Rating Scale[2]

Providers should be sensitive to, and respectful of, how different cultures perceive and express pain.

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[2] Hockenberry MJ, Wilson D, Winkelstein ML. *Wong's Essentials of Pediatric Nursing*, (7th ed), St. Louis, 2005, p. 1259. Used with permission. Copyright, Mosby.

Documentation & Patient Care Reports

Documentation should occur for all EMS events where a patient was encountered, and one or more clinical guidelines were used to determine patient treatment and/or disposition. The use of a narrative is essential to a complete patient care record and provides an efficient means to share patient information for continuity of care between prehospital and hospital staff.

A copy of the pre-hospital patient care report – paper or electronic – MUST be made available to the receiving emergency department.

Know your audience. Like every call, every report is unique. The disposition of the patient can help you convey why and how you provided care. Remembering the **BIG Five**[3] can help.

"BIG Five" of Patient Transports:

1) Write for Doctors, Nurses, and Allied Professionals
2) Organize as if the patient will become unconscious and unable to provide any information to staff after hand off.
3) Assume that the person reading your report knows nothing about anything that happened before the patient arrived in the ED.
4) Make sure the reader knows WHEN you did what you did.
5) Presume nothing and leave nothing [relevant] to the imagination.

"BIG Five" of Death in the Field:

1) Write for medical examiners, homicide detectives, and criminal justice attorneys.
2) Organize as if you expect to see the report projected onto a giant screen in a courtroom.
3) Assume that the person reading your report knows nothing about anything that happened while you were on the scene.
4) Make sure the reader knows WHY you didn't treat or transport.
5) Presume nothing and leave nothing [relevant] to the imagination.

"BIG Five" of patients not transported:

1) Write for the Attorney who may sue you over this call.
2) Organize as if you expect to see the report projected onto a giant screen in a courtroom — because it will be.
3) Assume that the person reading your report knows nothing about anything that happened while you were on the scene.
4) Make the reader understand WHY you didn't treat or transport.
5) Presume nothing and leave nothing [relevant] to the imagination.

If it is not documented, it did not happen. Every pertinent finding, every negative finding, every action taken, exists only if documented properly.

[3] https://www.ems1.com/ems-products/consulting-management-and-legal-services/articles/1056598-How-to-avoid-documentation- disasters/

[4] www.ada.gov/regs2010/service_animal_qa.html

Medical Care During Pandemics

During periods of pandemic (e.g. SARS-COV-2, COVID-19) the following guidelines should be followed as endorsed by the Centers for Disease Control and Prevention[1]

- **EMS personnel working in areas with moderate to substantial community transmission** are more likely to encounter asymptomatic or pre-symptomatic patients with SARS-CoV-2 infection. If SARS-CoV-2 infection is not suspected in a patient (based on symptom and exposure history), EMS personnel should follow Standard Precautions (and Transmission-Based Precautions if required based on the suspected diagnosis). They should also:
    - Wear eye protection in addition to their facemask to ensure the eyes, nose, and mouth are all protected from splashes and sprays of infectious material from others.
    - Wear an N95 or equivalent or higher-level respirator, instead of a facemask, for aerosol generating procedures.
- **For EMS personnel working in areas with minimal to no community transmission,** the universal eye protection and respirator recommendations described for areas with moderate to substantial community transmission are optional. However, EMS personnel should continue to adhere to Standard and Transmission-Based Precautions, including use of eye protection and/or an N95 or equivalent or higher-level respirator based on anticipated exposures and suspected or confirmed diagnoses.
- Universal use of a facemask for source control is recommended for EMS personnel. EMS personnel should always wear a facemask while they are in service, including in breakrooms or other spaces where they might encounter co-workers.
    - When available, facemasks are preferred over cloth face coverings for EMS personnel as facemasks offer both source control and protection for the wearer against exposure to splashes and sprays of infectious material from others.
    - Cloth face coverings should NOT be worn instead of a respirator or facemask if more than source control is needed.
- To reduce the number of times EMS personnel must touch their face and potential risk for self-contamination, EMS personnel should consider continuing to wear the same respirator or facemask (extended use) throughout their entire work shift, instead of intermittently switching back to their cloth face covering.
- Respirators with an exhalation valve are not recommended for source control, as they allow unfiltered exhaled breath to escape.
- EMS personnel should remove their respirator or facemask, perform hand hygiene, and put on their cloth face covering when leaving at the end of their shift.

[1] https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-for-ems.html

Aerosol-Generating Procedures

EMS personnel should exercise caution if an aerosol-generating procedure (AGP) is necessary. When possible, EMS personnel should consult with **Medical Control** before performing aerosol-generating procedures for specific guidance.

- An N95 or equivalent or higher-level respirator such as disposable filtering facepiece respirators, PAPR, or elastomeric respirator instead of a facemask, should be used in addition to the other PPE by all personnel present while performing aerosol-generating procedures.
- Bag valve masks (BVMs), and other ventilatory equipment, should be equipped with HEPA filtration to filter expired air.
- If possible, the rear doors of the transport vehicle should be opened, and the HVAC system should be activated during AGPs. This should be done away from pedestrian traffic.
- If possible, discontinue AGPs prior to entering the destination facility or communicate with receiving personnel that AGPs are being implemented.
- If possible, providers present for the procedure should be limited to a minimum, to avoid unnecessary exposure to additional personnel.

- Providers should limit others riding in the ambulance while the patient is transported to the healthcare facility to only those essential for the patient's physical or emotional well-being or care (e.g. care partner, parent, etc).

- Patients and family members should wear their own cloth face covering (if tolerated) prior to the arrival of EMS personnel and throughout duration of the encounter, including during transport. If they do not have a face covering, they should be offered a facemask or cloth face covering, as supplies allow.

  - Facemasks and cloth face coverings should not be placed on young children under age 2, anyone who has trouble breathing, or anyone who is unconscious, incapacitated or otherwise unable to remove the mask without assistance.
  - If a nasal cannula is used, a facemask should (ideally) be worn over the cannula.

II. FUNCTIONAL NEEDS OF PATIENTS

The way in which care is provided may need to be modified to accommodate the specific needs of patients with functional limitations or communication barriers. Medical care should not intentionally be diminished and/or underperformed during the triage, treatment, and transport of these patients without sound clinical rationale.

Communication Barriers

Providers should utilize tools to overcome language barriers when caring for patients with fluency in a different language than their own. Having telephone and/or video accessible service with live language interpreters is ideal. Other tools include electronic applications such as Google Translate and written communication. Providers should utilize and be mindful of the patient's use of non-verbal communication (e.g. eye blinking, nodding).

Providers should make every effort to obtain primary information about a patient's complaint and symptoms directly from the patients. However, providers may utilize family members of the patient to obtain secondary information or pertinent data. Transport of a family member who is fluent in the patient's language can also have a calming influence on some patients and is encouraged. However, provider should be weary of intentional false/edited translation by on scene translators, especially in situations where abuse or neglect of patient is

suspected. Notation of non-verbal communication from patients is invaluable in these situations.

American Sign Language is a language and serves as the primary language of many persons within the United States who are deaf or hard of hearing. If providers are unfamiliar with ASL, written communication should be utilized.

Physical Barriers

Providers should look for a patient's adjunct assist devices and identify their physical needs by speaking with the patient, family, or bystanders. Providers should also look for medical alert bracelets or medical documents. Assistance adjuncts include but are not limited to:

(a) Extremity protheses
(b) Hearing aids
(c) Magnifiers
(d) Tracheostomy speaking valves.
(e) Wheelchair or scooters

Providers should document the patient's functional need and the avenue exercised to support the patient, if applicable, how that need was managed. Providers should make every effort to transport any adjunct devices that facilities the activities of daily living for the patient.

Bariatric patients should be asked if they need assistance with ambulation in the same manner as other people with medical conditions limiting their mobility.

Service Animals

Service animals are not classified as pets. Service animals are not required to wear a vest or a leash. EMS providers may ask the patient (1) if their service animal is required because of a disability and (2) what work or task the animal has been trained to perform. It is illegal to ask for special identification or documentation from the service animal's partner. Animals that solely provide emotional support, comfort, or companionship do not qualify as service animals.

By law service animals should always be permitted to accompany the patient with the following exception:
A public entity may ask an individual with a disability to remove a service animal from the premise if (a) the animal is not housebroken or (b) the animal is out of control and the animal's handler does not take effective action to control it.

Service animals must be allowed anywhere in a hospital that the public and patients may go. If a patient is unable to care for their service animal while in the hospital, the patient can arrange for a family member or friend to come to the hospital to provide these services or to keep the dog during the hospitalization.

It is preferable that a service animal and its handler are not separated. If space in the ambulance is crowded and the animal's presence would interfere with the ability to treat the patients, providers should make other arrangements to have the service animal transported to the hospital.[4] If the patient is incapacitated and cannot personally care for the service animal, a decision to transport the animal can be made at the provider's discretion. EMS providers are not responsible for the care of the service animal.

III. **ABUSE AND MALTREATMENT**

EMTs and paramedics are mandated reporters of abuse. Abuse and maltreatment can happen to patients of all ages. Human trafficking is also considered a form of abuse. Any provider who has cause to believe that an individual's physical or mental health or welfare is endangered because of abuse or neglect should report it. Reporting serves as a request for investigation, not accusation. Mandated reporters are given immunity from legal liability for reports made in good faith.

Patients may be unwilling or unable to disclose abuse or maltreatment, so the responsibility falls on EMS personnel to assess the situation, document appropriately, and take appropriate action to secure a safe place for the patient. EMS providers should not take it upon themselves to investigate, interview, or intervene – these actions should be left for the appropriate law enforcement personnel.

Remember these patients have been recently traumatized with control over their life and/or bodies lost to the perpetrator. Though scene safety and treating potential life threats still takes priority, when interacting with this patient, it is important to reinforce that they are safe with you. Reinforcing that they have control over their bodies again by taking extra care to clearly explain all procedures and assessments you would like to perform and obtaining expressed verbal consent before performing them will empower the patient and set them up for success for the care and potential investigation that will follow transfer of patient care.

SANE Services for Sexual Abuse

In cases involving sexual assault patients have the right to have a Forensic Medical Exam (FME) performed by trained Sexual Assault Nurse Examiner (SANE Nurse). Per LSA R.S. 40:1216.1, no hospital or healthcare provider (including EMS) shall directly bill a victim of a sexually oriented criminal offense for any healthcare services rendered in conducting a forensic medical examination as provided for in R.S. 15:622.

The FME can still be performed if the assailant is unknown. FME can be performed regardless of the amount time that has passed since the assault, but evidence will only be collected up to 96 hours after assault for patients 12+ and 72 hours after for patients 11 and younger. A patient does not have to report the assault to law enforcement to receive services and may refuse any part of the exam. Patients 18+ have the option to report to law enforcement anonymously. The patient has 1 year from the day the evidence is collected to report before the evidence is discarded. The FME includes:

(1) Patient advocate who is only there to guide patient through the process and establish a long-term case worker for legal, financial, social assistance, mental health services.

(2) Forensic evidence collection including photography of injuries and specimen collection.

(3) HIV/STI testing and preventative medication

(4) Clothing and toiletries if needed.

(5) Referrals for follow up care.

(6) Development of a safety plan including emergency housing if it is needed.

If you respond to a call for sexual assault that has recently occurred AND the patient has expressed interest in receiving an FME the provider should recommend avoiding the following activities for the preservation of evidence. The patient should be made aware of these recommendations, with the choice to follow them ultimately being their choice:

(1) Bathing/showering

(2) Using the restroom

(3) Changing clothes

(4) Combing hair

(5) Brushing teeth

(6) Cleaning the area

Any soiled linen or clothing involved in the assault should be transported with patient in a brown paper bag. This includes any clothing removed by EMS. Debris found on linen can be utilized as evidence. For this reason, care should be taken to avoid unnecessary handling or movement of linen before placing it in a bag.

Human Trafficking:

Human trafficking is also considered a form of abuse. Human trafficking is the forcing or cohesion of an individual to provide services/labor against their will. Human Sex Trafficking is when those forced services/labor include sexual acts. Trafficking is often perpetrated by someone the victim knows and trusts such as family members, friends, and romantic partners. Keep in mind U.S. Trafficking Victims Protection Act of 2000 (TVPA) states that "any commercial sex act if the person is under 18 years of age, regardless of whether any form of coercion is involved, is defined as human trafficking". Look for warning signs such as:

(1) Show signs of mental/physical abuse.

(2) Appear to be coached on what to say regarding events leading to medical complaints.

(3) Show signs of being denied food, water, medical care by specified caretaker.

(4) Appears to have unstable living conditions where they have limited control over personal decision making, and/or lack personal possessions.

(5) Juvenile engaged in sex work.

(6) Patients are vague about their relationship with who they live with.

(7) Patient has timid, fearful, or submissive interactions with person they live with or is present with them on provider arrival.

(8) Patient has a controlling parent, guardian, romantic partner, or "sponsor" who will not allow patient

to be assessed alone or without input from them.

(9) Patient is from out of town with no specific explanation of how or why they came to the region.

Not all victims will disclose their situation due to fear, or lack of trust with the provider. It is not the provider's job to investigate. If you suspect a patient may be trafficked, transportation to SANE capable facility if possible and disclose concerns to receiving facility on arrival.

Each EMS agency should maintain a policy for how to report abuse or maltreatment. However, the following general principles apply when managing scenes and/or caring for a patient where abuse or neglect is suspected:

(10) Consider scene safety, as always. Survey the scene for factors that could adversely affect the patient's welfare. Providers should not confront suspected perpetrators as this may create an unsafe situation for EMS and for the patient. Providers should consider seeking assistance from law enforcement officers early.

(11) Address life-threatening issues and transport the patient even if no medical indication is present. EMS providers should not force child transport. If the suspected perpetrator is present and interferes with transportation of the patient or is influencing the patient's acceptance of medical care, law enforcement should be involved as soon as possible, and Medical Control should be consulted as needed for guidance.

(12) Thoroughly document the child's history and physical exam findings. Providers should document objective findings and use quotes to reference patient or family statements. Providers should not make accusations or opinions in their patient care reports.

(13) If SANE services are indicated/requested for suspected/reported sexual assault, ensure your hospital destination has those services available. LERN can be contacted for guidance.

(14) Upon arrival at the ED, notify the receiving nurse or physician of the suspected maltreatment. Most hospitals have a protocol in place that will anonymize patient names to prevent perpetrators from locating patients. Collection of names from patients of anyone they fear may try to locate them can be added to triage as a fail-safe.

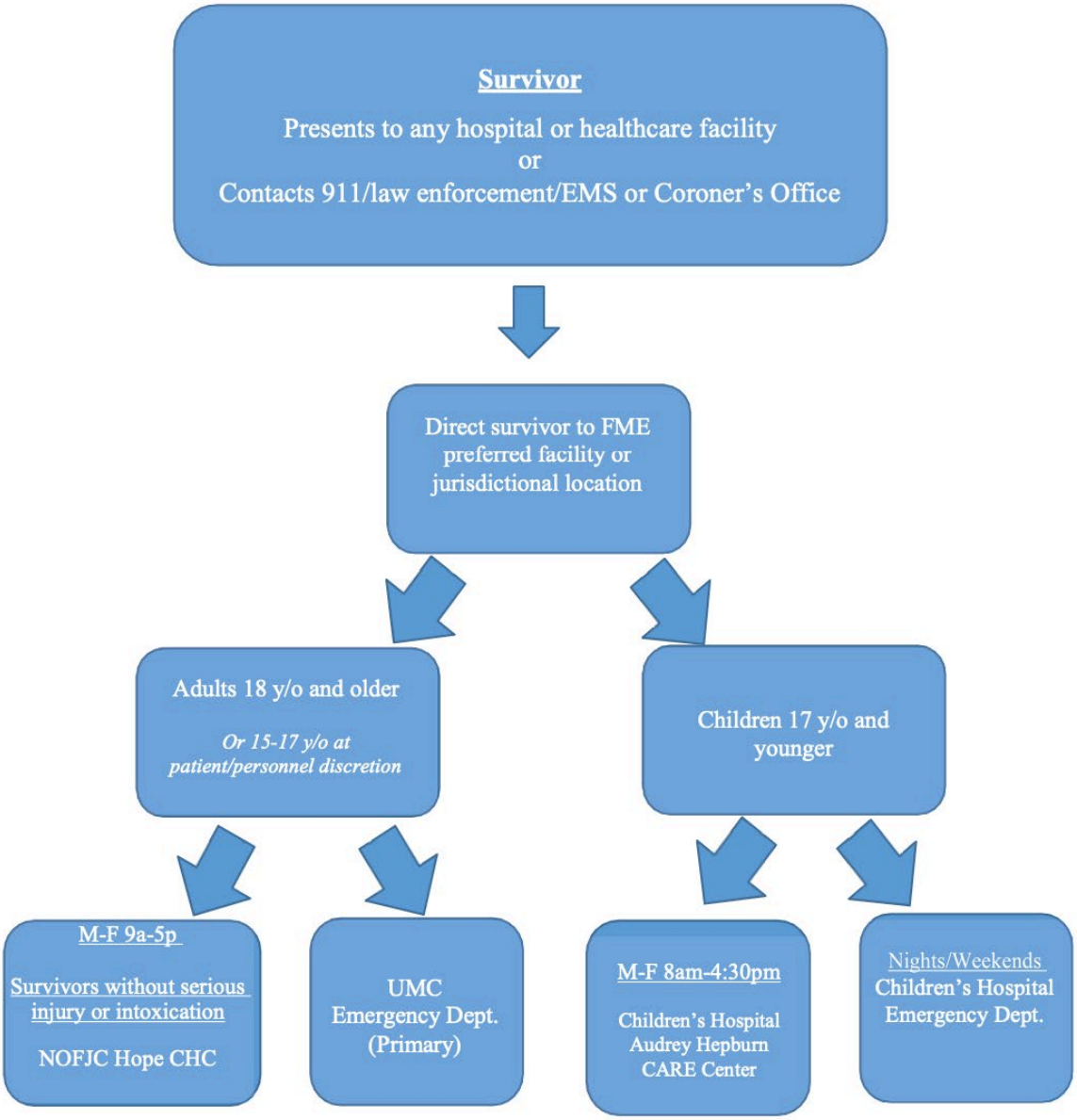
(15) This notification and handoff does not relieve a provider of their responsibility to report. Any mandated reporter who knowingly and willingly fails to report may be fined, imprisoned, or both.

The Department of Child and Family Services investigates child abuse and neglect and provides services for children and their families. Call **1-855-4LA-KIDS** (**1-855-452-5437)** 277/365 to report concerns for child abuse or neglect. All hotlines have trained operators to receive reports, however if an operator is not available, a voicemail system is available. By law, all reports made orally by mandated reporters must be followed by a written report to DCFS within five days. This can be done online at https://mr.dcfs.la.gov/c/MR_PortalApp.app

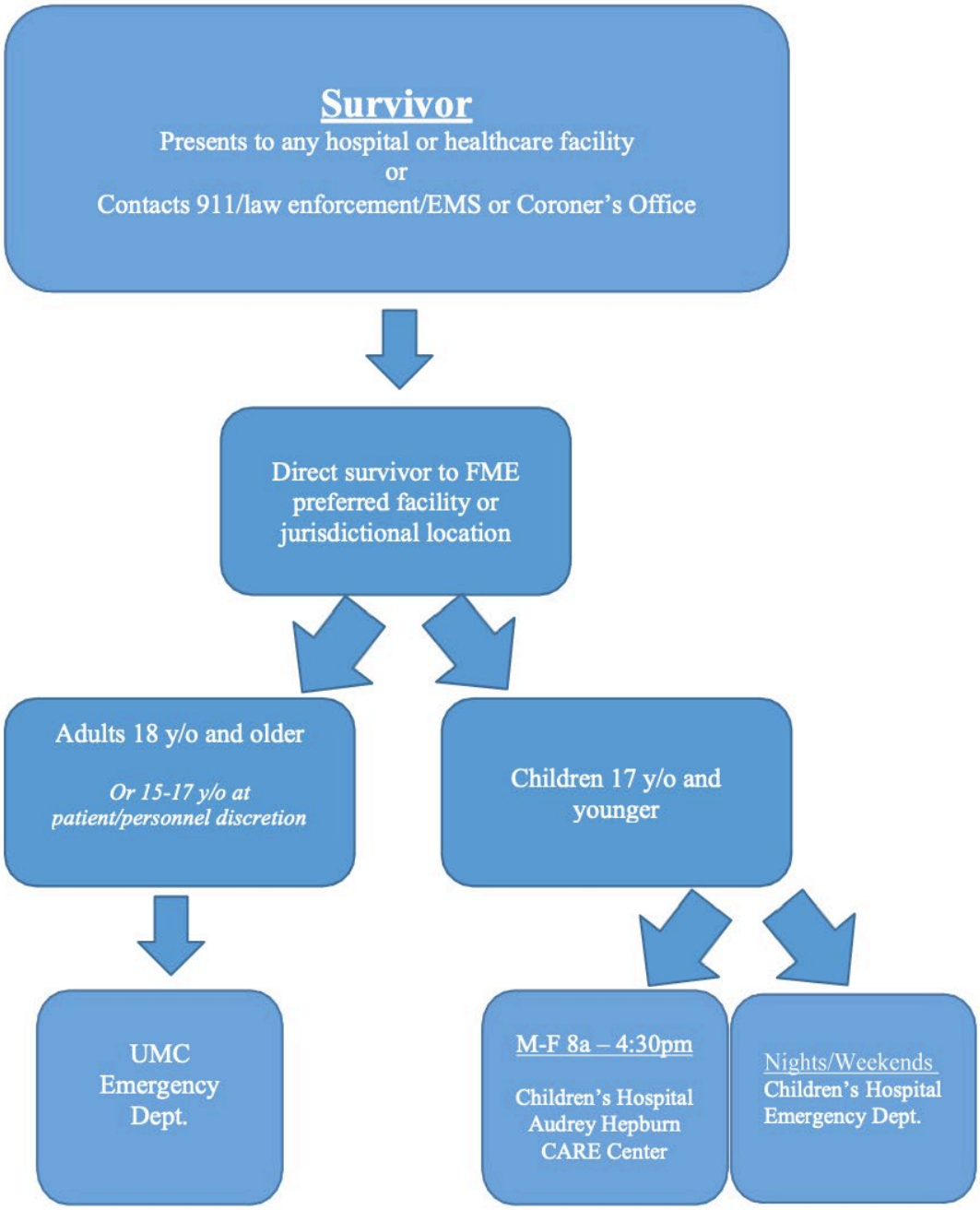
Adult Protective Services is responsible for investigating reports and arranging for services to protect vulnerable adults age 18-59 and emancipated minors who are at risk of abuse, neglect exploitation or extortion. Reports of adult abuse may be made to **1-800-898-4910**.

Elderly Protective Services protects people who are 60 or older from physical or emotional abuse as well as neglect by caregivers. The law also protects seniors from self-neglects and from other people misusing or stealing their money. Reports of elder abuse may be made to **1-833-577-6532** or **225-342-0144.**

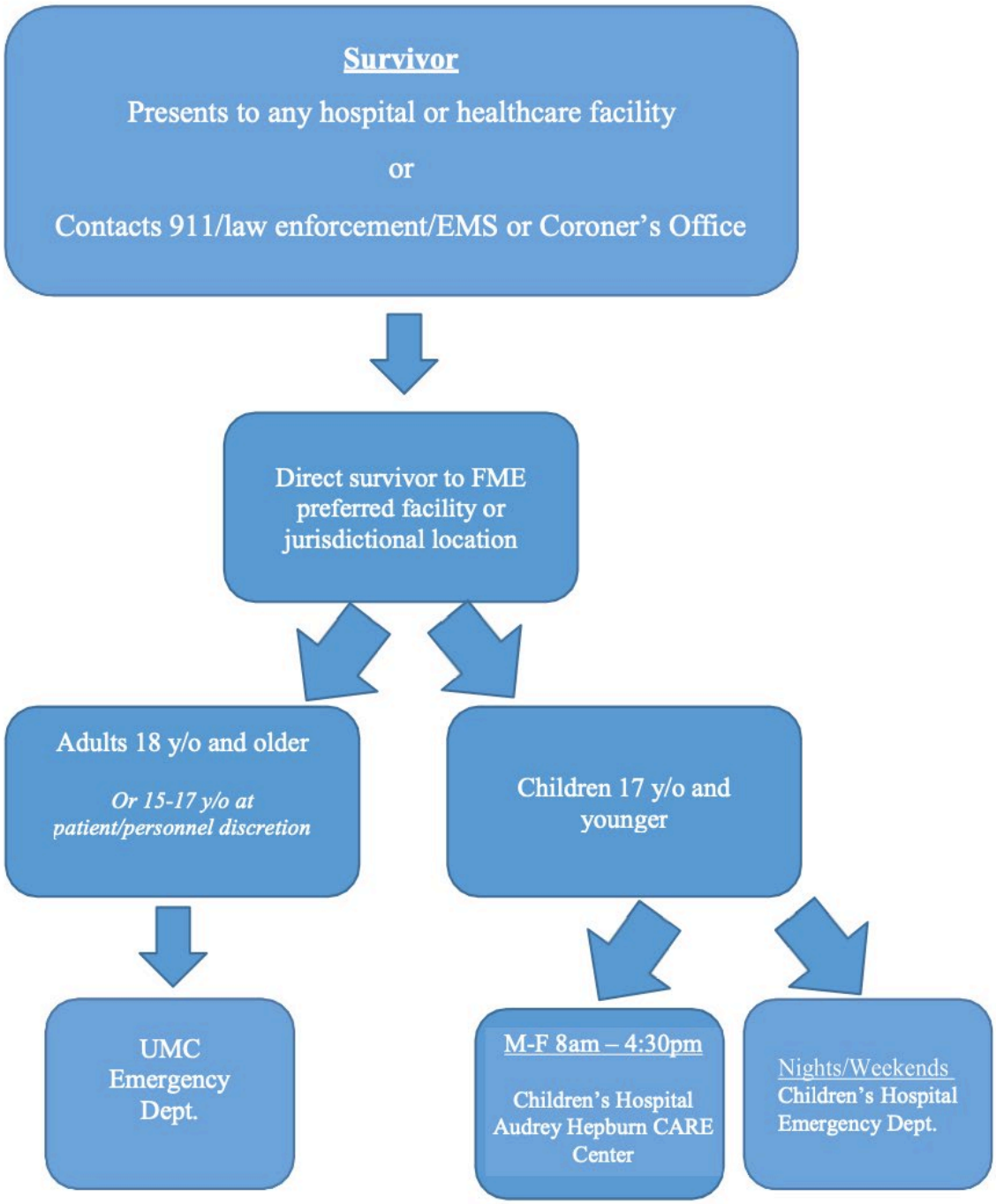
APPENDIX 2: ORLEANS PARISH SEXUAL ASSAULT TEAM RESPONSE



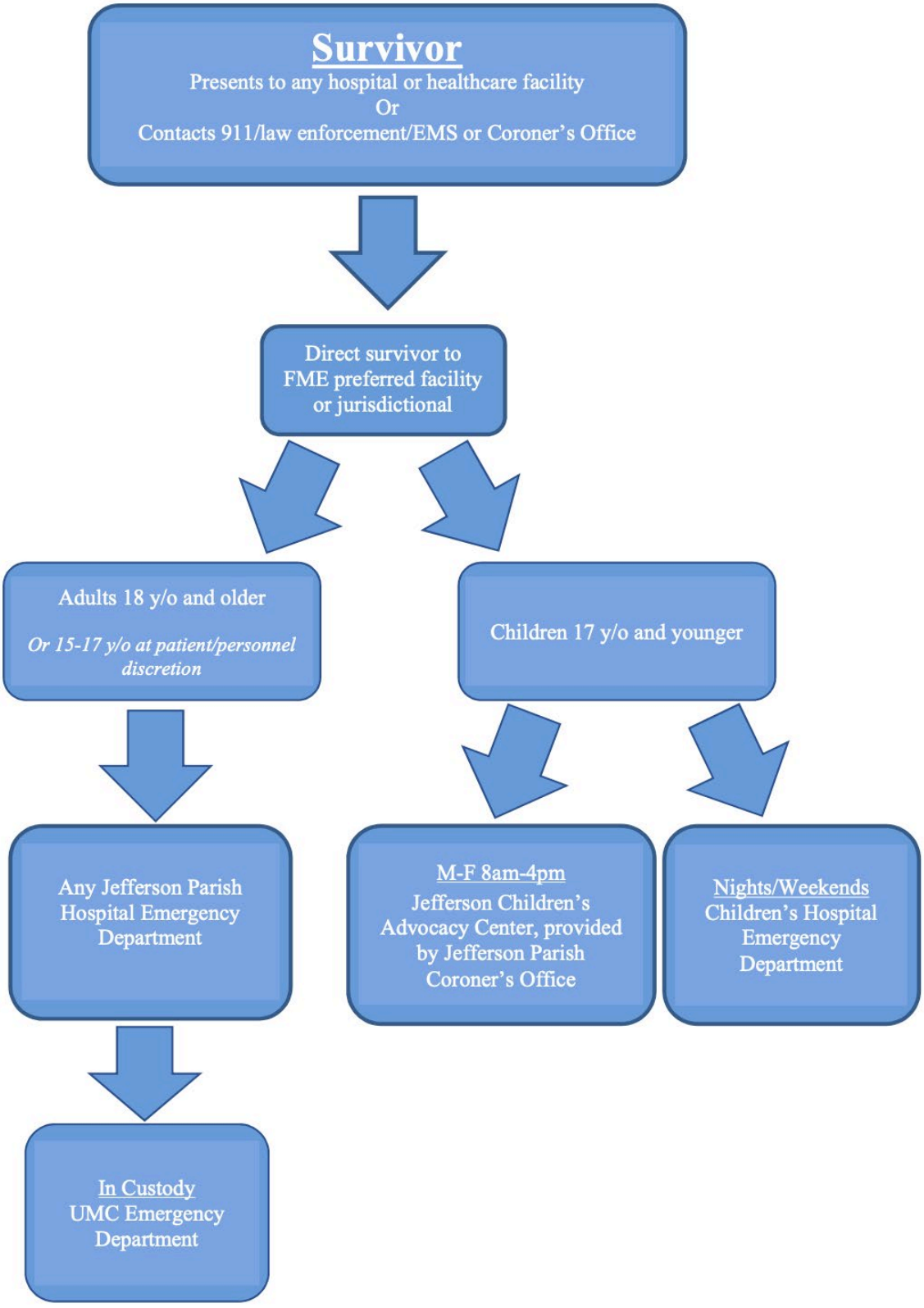
APPENDIX 4: PLAQUEMINES PARISH SEXUAL ASSAULT TEAM RESPONSE



APPENDIX 3: ST. BERNARD PARISH SEXUAL ASSAULT TEAM RESPONSE



APPENDIX 5: JEFFERSON PARISH SEXUAL ASSAULT TEAM RESPONSE



IV. ADDITIONAL MEDICAL PEARLS

Reactive Airway and Pulmonary Edema

Prehospital differentiation between severe Reactive Airway Disease (RAD) and Pulmonary Edema can be difficult. Particularly when only auscultation is used to differentiate between cardiac wheeze and pulmonary wheeze in patients with decreased lung sounds. In patients presenting with respiratory distress, auscultation of lung sounds alone is not sufficient for a field diagnosis of RAD over cardiac pulmonary edema. Blood pressure, pitting edema, skin condition and ETCO2 waveform should be considered, equal weight to lung sounds in these cases. If a patient is hypertensive with systolic over 180 mmHg, clammy or diaphoretic, has noted pitting edema, and/or their ETCO2 waveform is not shark fin, the provider should be highly suspicious of a cardiac nature of presentation and follow the pulmonary edema guidelines over RAD guidelines. Early CPAP should be utilized in either case, particularly with a patient who has been intubated in the past.

Patients may become intolerant of the CPAP due to anxiety. Often this anxiety stems from a combination of hypoxia and the unfamiliarity of the patient with the CPAP. An explanation of the CPAP device and supplemental O2 should be provided while setting up equipment to help prepare the patient. If anxiety persists every effort should be made by the provider to verbally calm the patient followed by utilization of a benzodiazepine if needed.

Prehospital point of care ultrasound (POCUS) should also be utilized if available for differentiation between the two conditions. When a patient presents with respiratory distress a lung ultrasound should be obtained. If (3) or more B-lines are present, pulmonary edema guidelines should be followed. Providers should also be checking for decreased or absent lung sliding indicative of developing or present pneumothorax.

In cases of severe respiratory distress caused by bronchospasm in RAD in patients >60 years old with a cardiac history the risks and benefits of 1:1000 IM Epinephrine should be weighed. However, the management of a patient's airway remains the main priority in these cases. Similarly, use of magnesium sulfate in patients with a history of renal failure should be done with caution and constant reassessment and monitoring. If there is any uncertainty that the risk of either of these medications may not outweigh the benefits, contact Medical Control for guidance.

Difficult Airway Management[5,6]

A difficult airway is one in which the EMS provider identifies potential attributes of the patient that would make it difficult to utilize a bag-valve mask (BVM), insert a supraglottic airway (SGA), perform laryngoscopy, and/or perform a surgical airway. Providers should prepare for alternative airway management and minimize risks of

further patient decompensation when difficult airway is identified.

Numerous algorithms exist to support providers in difficult airway management. MOANS (Mask seal, Obesity/obstruction, Age 55, No teeth, Stiff lungs) and LEMON (Look externally, Evaluate the 3-3-2 rule, Mallampati, Obstruction, Neck mobility) are both commonly referenced.

Quick assessment in the prehospital setting limits the utility of several mnemonics; however, the 4 D Concept is easy to remember:

The Four Ds of Difficult Laryngoscopy (footnote):

Dentition – prominent upper incisors, receding chin
Distortion – edema, blood, vomit, tumor, infection.
Disproportion – large tongue, small mouth, bull neck, short chin to larynx distance
Dysmobility – TMJ, cervical spine collar

All intubations should be considered potential difficult airways. Providers should routinely have alternative airway management tools prepared prior to attempting endotracheal intubation. All members of the team should be aware of the contingency plan(s). Tools/techniques for difficult airways management in the prehospital setting include:

- Two-person bag mask ventilation
- Oropharyngeal and nasopharyngeal airways
- Alternative laryngoscope blade
- Video laryngoscopy
- Awake nasotracheal intubation
- ETT introducer (e.g. gum elastic bougie)
- Supraglottic airway device (e.g. LMA, iGel, Combi tube, airQ)

Insertion of a Supraglottic Airway Device is a skill EMTs and Advanced EMTs can perform. All EMTs must be trained and prove competency on the insertion of supraglottic airway devices.

Preoxygenation & Apneic Oxygenation[7]

Preoxygenation should be attempted prior to initiating management of the difficult airway to delay the onset of desaturation while apneic. Supplemental oxygen may be delivered via nasal cannula, facemask, CPAP, or BVM (with PEEP valve). Preoxygenation via nasal cannula best serves as an adjunct in addition to using a facemask or BVM; the provider must ensure that the cannula does not interfere with maintaining an effective seal while using the other device.

It is sometimes difficult to achieve effective preoxygenation in the prehospital setting due to factors such as patient agitation or lack of manpower to maintain an effective mask seal; however, providers should make every effort to provide at least 30 seconds of preoxygenation. Use of sedatives (ex. ketamine, benzodiazepine) to assist the uncooperative patient in whom intubation is anticipated can facilitate preoxygenation.

The ideal length of time for preoxygenation is 3-4 minutes; however, allowing the patient to take eight maximal breaths over 60 seconds allows for more rapid preoxygenation when necessary. If inadequate respiratory drive is present, providers can assist patient breaths via BVM. Providers should remember that there is an inherent lag time with pulse oximetry (SpO_2). In critically ill patients this may be > 90 seconds. If there is no improvement in SpO_2 after 3-4 minutes, it is reasonable to proceed with intubation; there is no proven benefit to extending the preoxygenation period beyond 4 minutes. _____

[5] Walls RM. The emergency airway algorithms. In: Walls RM, Murphy MF, editors. Manual of Emergency Airway Management. 4th. Philadelphia: Lippincott Williams and Wilkins; 2012.

[6] https://litfl.com/difficult-airway-algorithms/

[7] https://litfl.com/preoxygenation/

Apneic oxygenation is generally considered an adjunct to be used during rapid sequence intubation (i.e. with a paralytic). Giving supplemental oxygen at 15 lpm via nasal cannula during ETT insertion helps to maintain an adequate SpO_2 while the tube is secured and connected to an oxygen source. Apneic oxygenation is likely to mostly benefit patients with difficult airways, but it should be considered for all intubations. Apneic oxygenation does not diminish the need for effective preoxygenation.

Sepsis

Sepsis is a life-threatening organ dysfunction caused by a dysregulated host response to infection and should be treated as a "life threatening condition that arises when the body's response to an infection injures its own tissues and organs. Early recognition and aggressive treatment is vital for these patients. Certain co-morbidities are at higher risk for development of sepsis including but not limited to:

- Immunocompromised
- Developmental Delay
- Cancer patients
- Permanent/Semi-permanent Catheters (PICC lines, Foley catheters, etc.)
- Sickle Cell Patients
- Bedridden/immobilized
- Recent surgery
- IV drug users

If patient has an obvious or suspected infection **PLUS two or more** of the following signs and symptoms a Sepsis Alert should be called to the receiving ED:

- Respiratory Rate > 20/minute
- Heart Rate > 100/minute
- Altered Mental Status from baseline
- Temp > 100.4 F or < 96.0 F

Lactated Ringers and O2 as needed is the indicated with any sepsis patient. However, if patient systolic blood pressure is <90 mmHg or MAP is <65 patient should be considered in Septic Shock.

Septic shock is caused by peripheral anterior lat vasodilation, which results in low systemic vascular resistance, high cardiac output, severe hypotension, and inadequate tissue perfusion. As such it should be treated with aggressive fluid resuscitation using LifeFlow or pressure bag and vasopressors.

Fluid overload/pulmonary edema should always be considered, especially in patients with a history of CHF, renal failure, and dialysis. To avoid this complication, administer 500mL of fluid and reassess with focus on lung sounds and any signs of respiratory distress.

The vasopressor of choice for septic shock is norepinephrine to be given as a drip. Administration of 1:100,000 Epinephrine (Push Dose epinephrine) while drip is prepared is recommended.

Stroke

Stroke symptoms may vary and include but are not limited to:

- Severe, unexplained headache
- Dizziness or vertigo
- Visual loss
- Communication deficit
- Facial or limb numbness or weakness
- Lack of coordination or disruption of gait

Treatment with mechanical thrombectomy is considered standard of care for patients with proximal large vessel occlusion (LVO). Early diagnosis and transport to an endovascular treatment facility is vital for better neurologic outcomes. The Cincinnati Prehospital Stroke Scale[8] (CPSS) is a quick tool that can be used for stroke recognition upon EMS arrival. If any of the following three signs is abnormal, the probability of a stroke is 72%.

Facial Droop – have patients show their teeth or smile.

- *Normal*: both sides of face move equally
- *Abnormal*: one side of the face does not move at all

Arm Drift – have patients close their eyes and hold both arms out straight for 10 sec

- *Normal*: both arms move equally, or both do not move at all
- *Abnormal*: one arm does not move, or one arm drifts down compared with the other

Speech – have patients say "you can't teach an old dog new tricks"

- *Normal*: patient uses correct words with no slurring
- *Abnormal*: patient slurs words, uses the wrong words, or is unable to speak

Time[9] – time last seen normal (LSN) within 24 hours. If the patient is unable to provide a history, LSN is the time last seen in a normal state as reported by a bystander. Patients with "wake up strokes" should be presumed to have a time of LSN < 24hours.

[8] Kothari, R.; Hall, K.; Brott, T.; Broderick, J. (1997-10-01). "Early stroke recognition: developing an out-of-hospital NIH Stroke Scale". Academic Emergency Medicine. **4** (10): 986–990

The CPSS is quick but fails to measure cortical signs such as aphasia and neglect commonly seen with large vessel occlusions, thus it must be followed by utilization of the Vision, Aphasia, Neglect (VAN) scale whenever a stroke is suspected.

A patient is considered VAN positive when they display upper arm weakness plus one or more of the following:

Visual Field Disturbance – new onset blindness, double vision, field cut

Aphasia – inability to speak, paraphasia errors (use of wrong word such as identifying a pen as a watch), inability to understand or follow commands (do not count slurring of words)

Neglect – forced gaze, inability to track to one side, ignoring one side, inability to identify their own arm, inability to field both sides at the same time.

The above screening tools combined – FAST-VAN – provide a high level of predictably for identifying LVO occlusions that may benefit from mechanical thrombectomy. The Stroke ROPE guideline outlines how an EMS provider should choose a hospital destination based on the patient's presenting symptoms and the transport time to each facility. Traffic delays should be considered when factoring in the time of transport.

Hospital notification is a priority treatment when new onset focal neurological symptoms are present.

**Consider contacting LERN for every stroke activation even when destination has already been chosen/requested by the patient/family.

Stroke Center Levels/Designations[10]

The Joint Commission, American Heart Association, and American Stroke Association developed program requirements for hospital certification as a stroke center. Louisiana Emergency Response Network (LERN) follows these requirements and recognizes the following categorization of stroke facilities:

- Stroke Bypass Hospital (**Bypass**, formerly known as LERN Level 4): These facilities lack the capability to provide the standard of care for acute stroke. Transfer protocols are in place for transfer to higher levels of care with a written and agreed upon relationship with more acute hospitals.

- Acute Stroke Ready Hospital (**ASRH**, formerly known as LERN Level 3): Facilities in this category have the following capabilities:
    - A CT scan is able to be performed within 25 minutes of patient arrival.
    - Vascular neurology is not available.
    - Neurosurgery is not available.
    - Treatment capability includes IV thrombolytic and medical management of stroke.

- Interventional therapy is not available.
- A dedicated stroke unit is not usually available.

- Primary Stroke Center (**PSC**, formerly known as LERN Level 2): Facilities in this category have the following capabilities:
    - A CT scan can be performed within 25 minutes of a patient's arrival.
    - Access to vascular neurology expertise is available within 15 minutes.
    - A neurosurgeon is available within 2 hours.
    - Treatment capability includes IV thrombolytics and medical management of stroke.
    - Interventional therapy is not routinely available.
    - A dedicated stroke unit is available.

ASRH and PSC stroke facilities provide acute stroke care in urban and rural areas where transportation and access are limited. Timely transfer to a higher-level facility is often indicated; however, their designation recognizes models of care that have shown utility, including "drip-and-ship" and telemedicine.

- Primary Stroke Center with Endovascular Capability (**PSC-E**): Facilities in this category are similar to Primary Stroke Centers as outlined above but are also able to perform mechanical thrombectomy.

- Thrombectomy Stroke Center (**TSC**): Hospitals in this category are like PSC-E; however, the facility has more services for stroke patients and the clinicians involved have higher training and certification reporting requirements than PSC-E centers.
    - A CT scan can be performed within 25 minutes of patient arrival.
    - Access to vascular neurology expertise is available within 15 minutes.
    - A neurosurgeon is available within 2 hours.
    - Treatment capabilities include intravenous thrombolytic and endovascular therapies, like intra-arterial thrombolytic and mechanical thrombectomy.

- Comprehensive Stroke Center (**CSC**, formerly known as LERN Level 1): Facilities in this category can manage all forms and severities of stroke, both ischemic and hemorrhagic, and can provide 24/7 access to specialty care. CSC facilities have the following capabilities:
    - CT scan can be performed within 25 minutes of patient arrival.
    - Access to vascular neurology expertise is available within 15 minutes.
    - A neurosurgeon is available within 30 minutes.
    - IV thrombolytic, endovascular therapies (e.x. intra-arterial thrombolytic, thrombectomy, coiling) and surgical therapies (e.x. aneurysm clipping, carotid endarterectomy, hematoma removal/drainage) can be performed.

[9] The original CPSS, generated in 1997, did not include **T**ime. LSN up to 24 hours is currently considered standard of care.
[10] http://lern.la.gov/wp-content/uploads/Stroke-Level-Requirements.pdf

Region 1 Hospital Stroke Levels

Hospital	Stroke Level
East Jefferson General Hospital **	TSC
Lakeside Hospital	ASRH
New Orleans East Hospital	PSC
Ochsner Baptist Medical Center	ASRH
Ochsner Medical Center **	CSC
Ochsner Medical Center-Kenner	PSC
Ochsner Medical Center-West Bank	ASRH
St. Bernard Parish Hospital	ASRH
Touro Infirmary	PSC
University Medical Center – New Orleans (Formerly LSU Interim Public Hospital)	PSC-E
VA Medical Center	ASRH
West Jefferson Medical Center **	CSC

** = endovascular capable 24/7/365 days a year

Hospitals with intermittent endovascular capability must update the ESF-8 Portal with status

CSC = Comprehensive Stroke Center (Formerly Level 1/certified by TJC)

TSC = Thrombectomy Capable Stroke Center (New designation/certified by TJC)

PSC E = Primary Stroke Center with endovascular capability (Formerly LERN Level 2 Stroke Hospital & must be certified by TJC, HFAP or DMV)

PSC = Primary Stroke Center (Formerly Level 2/certified by TJC, HFAP or DMV)

ASRH = Acute Stroke Ready Hospital (Formerly Level 3)

Bypass = Stroke Bypass Hospital (Formerly Level 4)

Off-Site Emergency Department	Stroke Enabled
East Jefferson Downtown ED	YES
Ochsner Emergency Room - Marrero	YES

LOUISIANA EMERGENCY RESPONSE NETWORK
Right Place. Right Time. Right Care.

Updated 1/26/2024

Providers within Region One should aim to transport patients with a suspected large vessel occlusion (i.e. VAN positive) to a CSC, TSC, or PSC-E. If the total transport time (from scene to the nearest CSC/TSC/PSC-E) is expected to be greater than 15 minutes, then providers should transport to a PSC or ASRH to ensure rapid assessment and treatment. Traffic delays should be considered when determining the expected time of transport.

Hyperactive Delirium with Severe Agitation (formerly Excited Delirium)

Hyperactive Delirium with Severe Agitation is a common, yet poorly understood condition. It has no universally accepted definition except that persons present with "delirium associated with agitation." Mentally, the patient is unable to focus his/her attention on any one thing and is often distracted by his surroundings. The subjects' inability to process rational thought often renders normal de-escalation procedures ineffective.

Common causes of Hyperactive Delirium with Severe Agitation (formerly Excited Delirium)

- drug overdose (ex. cocaine, methamphetamine, PCP) *
- drug withdrawal
- brain tumor
- dementia
- infection
- hypoxia or hypercarbia
- low or high blood sugar
- psychiatric patient off meds
- mental illness or acute psychosis*
- hyperthyroidism/" thyroid storm"
- head trauma

* most common

Hyperactive Delirium with Severe Agitation (formerly Excited Delirium) is presumed to be due a combination of:

(1) an individual's underlying physical or mental illness,

(2) excess catecholamine – either endogenous (ex. thyroid storm) or exogenous (ex. Cocaine, PCP, Methamphetamine, recreational Ketamine use),
and
(3) overstimulation of dopamine receptors. Heart rate, respiration, and temperature control are also affected by dopamine levels with elevation resulting in tachycardia, tachypnea, and hyperthermia.

Common signs of Hyperactive Delirium with Severe Agitation (formerly Excited Delirium)

- bizarre & aggressive behavior
- dilated pupils
- fear and panic
- hyperthermia
- incoherent speech
- inconsistent breathing patterns
- insensitive to pain
- nakedness
- paranoia
- profuse sweating (may be absent with severe hyperthermia)
- shivering
- superhuman strength
- violence directed at objects

Hyperthermia is a key risk factor of imminent death in patients with Hyperactive Delirium with Severe Agitation (formerly Excited Delirium). Another alarming symptom to the onset of death is "instant tranquility" - this is when the suspect had been very violent or vocal then suddenly becomes quiet and docile while in the car or sitting at the scene.

Treatment of Hyperactive Delirium with Severe Agitation (formerly Excited Delirium) involves four pillars. Care in the prehospital setting (as outlined in the ROPE guidelines) focuses on control of agitation.

Ketamine should be used with caution over benzodiazepines for chemical restraints in patients with history of psychosis such as schizophrenia and/or when psychostimulant use (such as ketamine, PCP, methamphetamines) is suspected. When Ketamine is administered with these underlying causes there is an increased risk of exacerbating presenting psychosis and potential for additional psychological damage to patients.

Benzodiazepines or Droperidol should also be utilized over Ketamine when a patient found in hyperactive delirium presents with signs of hyperthermia.

Unlike Benzodiazepines and Droperidol, Ketamine, will not address the life-threatening symptoms caused by central nervous system hyperactivity in this condition (ie tachycardias, tachypnea, and hyperthermia second to increased CNS activity).

Adrenal Crisis[11,12]

Adrenal crisis is a life-threatening emergency due to an acute deficiency in hormones produced by the adrenal gland – mineralocorticoids and glucocorticoids. This condition is most commonly seen in patients on steroids who have an acute illness or physiological stress, or have their steroids withdrawn. Addison's disease is the most common cause of adrenal insufficiency. Persons with a history of chronic lung disease, autoimmune disease, or organ transplant frequently fall into the cohort of patients with chronic steroid use.

Symptoms of adrenal crisis vary and are non-specific – patients may present with weakness, confusion, fever, nausea, vomiting, abdominal pain, hypoglycemia, or shock. A history of surgery, infection, burn, trauma, fluid loss, cardiovascular event (ex. MI), or failure to take medications should all be questioned.

Hypotension or shock out of proportion to the severity of the illness is the key feature of adrenal crisis. Treatment for adrenal crisis is steroid replacement. Administration of Methylprednisolone 125mg or Hydrocortisone 100mg is preferred. Adrenal crisis can be fatal if not diagnosed and treated aggressively. Providers should consider this diagnosis early and contact Medical Control for consultation.

Sickle Cell Pain Crisis

Many patients with a sickle cell pain crisis will not exhibit vital sign abnormalities. Patients may also not show behavior considered consistent with pain (e.g. walking, engaging in conversation, or having a calm appearance) while their pain levels remain high. The patient's pain should still be taken seriously with pain managed accordingly with available analgesics.

[11] www.litfl.com/weak-and-vomiting-an-endocrine-emergency/
[12] www.coreem.net/core/adrenal-crisis/

In addition to pain crises, patients with Sickle Cell Disease (SCD) are at risk for several life-threatening

complications.

Often the presentation of these complications is atypical. Potentially serious condition other than pain crises may include:

(a) Acute chest syndrome
    i. Hypoxia
    ii. Chest pain
    iii. Fever
(b) Stroke
    i. Focal neurologic deficit
(c) Shock
    i. Septic
    ii. Cardiogenic
    iii. Hypovolemic
(d) Meningitis
    i. Headache
    ii. Altered mental status
    iii. Fever
(e) Septic arthritis
    i. Severe pain in a single joint
    ii. Fever
(f) Splenic sequestration crisis (usually young pediatric patients)
    i. Abdominal pain, LUQ
    ii. Splenic enlargement (palpate with care)
    iii. Hypotension, tachycardia

Reserve oxygen for patients who are hypoxic. Supplemental oxygen is thought to suppress bone marrow and increase transfusion requirements. Only give supplemental oxygen to sickle cell patients whose SpO_2 is < 92%. Reserve fluid boluses for sickle cell patients that are overly hypovolemic; overhydration may have detrimental effects, including atelectasis or increased sickling. These individuals will usually provide a story of fluid losses (e.g. vomiting or diarrhea) and/or shows signs of sepsis. If fluid is required, saline boluses should be 10 ml/kg up to 1L.

Back Pain

Acute, nontraumatic back pain is a common patient complaint. While musculoskeletal etiologies generally are not emergent, providers should consider and assess life threatening signs and symptoms, including shock.

(a) Spinal cord compression (e.g. from spinal epidural abscess, malignancy, spinal epidural hematoma for patients on anticoagulants)
    i. Urinary and/or bowel incontinence
    ii.Inability to walk due to weakness
    iii. New neurologic deficits in extremities
    iv. Loss of sensation in saddle distribution
(b) Aortic dissection or ruptured abdominal aortic aneurysm (AAA)
    i. Unequal femoral or distal lower extremity pulses

ii. "Pulsatile" abdominal mass
iii. Associated abdominal pain and/or chest pain
iv. Known history of abdominal aortic aneurysm or dissection

(c) Pyelonephritis (Kidney Infection)
i. Fever
ii. Nausea, vomiting
iii. Urinary frequency/urgency
iv. Dysuria
v. Hematuria
vi. Abdominal pain
vii. Costovertebral angle tenderness to percussion

Providers should assess and document neurologic findings (ex. motor and/or sensory loss in arms/legs) in patients with back pain. Providers should additionally assess and document changes in perfusion or pulses. Consider transport to an appropriate specialty center if an aortic emergency is suspected – Medical Control can assist in decision making.

Pain Management

Pain is subjective with a wide range of presentations and tolerances for opioid medication. Patient pain level should always be assessed, when possible, based on reported pain scale of 1-10. For patients reporting moderate to severe pain (6-10) pain management is indicated. Different etiologies of pain respond better to certain medications. When considering which pain medication to administer keep in mind each medications strengths and weakness.

- **Ketorolac (Toradol) - (NSAID)**
    - **Best for:** moderate to severe pain caused by inflammation such as:
        - Moderate pain from trauma associated with swelling
        - Sickle Cell
        - bone cancer patients
    - **What it does well:**
        - does not affect mental status, respiratory drive, mobility of intestines
        - It is an ideal alternative for patients in remission from opioid abuse, patients with hypersensitivity to or reservations about opioid medications, patients presenting with constipation
    - **Considerations:**
        - Toradol should not be used in patient with renal concerns
        - Counterintuitively, use for ACS pain is not recommended as Toradol may cause an increased risk of cardiovascular thrombotic events, myocardial infarction, and stroke

- **Fentanyl (Opioid)**
    - **Best for:** almost any etiology of pain and very effective in treating more severe pain.

- **Consideration**
  - Can cause constipation, and should not be used for patients currently experiencing constipation
  - Can cause Altered Mental Status
  - Can cause CNS depression
  - Every patient will have different tolerance levels. As such, Fentanyl should always be titrated beginning with the lowest dose.

- **Ketamine (Disassociate with analgesic properties)**

  - **How is works:** It has anesthetic effects on the central nervous system (CNS) while triggering opioid receptors allowing it to simultaneous address the panic of the acute pain while producing euphoric effects to address the physical pain.
  - **Best for:**
    - severe persistent pain difficult to address with Fentanyl, particularly when it is also causing emotional distress such as:
      - Burns
      - Major fractures requiring manipulation, and/or splinting
  - **Considerations:**
    - Care should be taken to maintain a calm demeanor when interacting with patients given Ketamine to avoid adverse psychological reactions which can lead to uncooperative/combative behavior during transport and long term PTSD.
    - Ketamine also causes peripheral vascular constriction which can lead to extreme hypertension.
    - Sudden apnea
    - Acute psychosis can occur with ketamine administration.

Ketamine should not be administered to for pain to patients with history of psychosis, or suspected psycho-stimulant use (methamphetamine, PCP, recreational ketamine use), or to patient presenting with hypertension. Higher instances of adverse reactions are associated with rapid administration. As slow IV push is difficult to perform in the pre-hospital setting, Ketamine for pain should be administered IV drip over 10 minutes.

Any patient who is administered pain medication should be transported and closely monitored for potentially sudden adverse reactions. If any of these adverse reactions occur, Medical Control should be immediately activated for guidance.

V. MEDICATION INFUSIONS

Crystalloid Fluid Bolus

A fluid bolus (fluid challenge) is given at a rate of "wide open," typically through the largest IV catheter possible (14 – 18 gauge). Patients should be reassessed after each 250 – 500ml of fluid, particularly their lung sounds. This is especially the case when treating persons with cardiovascular disease and the elderly. When a fluid bolus is not going to be needed or anticipated, saline locks may be used.

Dextrose

The traditional treatment for hyperglycemia has been 50ml of D50W (aka "an amp of D50"); however, drug shortages, profound hyperglycemia, and the risk of tissue injury from extravasation have caused D50 to fall out of favor. Providers may administer dextrose via the following concentrations:

D50 (50% Dextrose): 25g in a 50ml prefilled syringe

D25 (25% Dextrose): 2.5g in a 10 ml prefilled syringe (usually reserved for pediatrics)

D10 (10% Dextrose): 10g in 100ml or 25g in 250ml bag

D50 is more viscous than other intravenous fluids and often requires two hands to administer. Providers may need to apply light pressure to the D10 bag if a very small catheter is used (22-24G)[13]. All concentrations have similar times for patient return to normal mentation.

Magnesium Sulfate ($MgSO_4$)

Recommended doses and rates vary based on the indication. Add 2-4 gm of $MgSO_4$ to 100 ml of NS or D5W and infuse as follows:

Asthma: 2g in 100ml given over 10 minutes = 150 gtts/min using a 15 gtt/ml macro drip set

Torsade de pointes: 2g in 100ml over 10 minutes = 150 gtts/min using a 15 gtt/ml macro drip set

Eclampsia: 4g in 100ml over 10 minutes = 150 gtts/min using a 15 gtt/ml macro drip set

Ketamine[14]

Ketamine has multiple routes of administration but is most often given intramuscularly or intravenously. Ketamine has been shown to cause hypoventilation requiring close airway monitoring and occasional airway intervention, such as bag mask ventilation or supplemental oxygen via nasal cannula.

Giving IV push ketamine slowly over one minute has been suggested to prevent hypoventilation. Alternatively, providers may administer ketamine via a slow infusion over 10-15 min when the safety of the provider or the patient is not in jeopardy.

via IV push: dose as per guideline given over 1-3 min

via infusion: dose as per guidelines mixed in 100ml given over 10 minutes

Additional adverse reactions reported with the use of ketamine are nausea and vomiting, increased airway secretions, laryngospasm, emergence phenomenon, associated intubation, and cardiac arrest following ketamine administration.

When Ketamine is utilized, it is prudent to monitor the patient closely for adverse events. If giving ketamine for agitation, providers should always have a bag mask ventilation device, advanced airway equipment, and cardiac monitoring including SpO_2 and $EtCO_2$.

Ketamine should never be used to chemically incapacitate someone solely for law enforcement purposes and not for a legitimate medical reason.

Vasopressors – see Cardiac Preambles

VI. CAPNOGRAPHY[15,16]

Capnography includes the noninvasive measurement of CO_2 partial pressure during respiration (primarily exhalation). This can be displayed as a color (colorimetric or qualitative), number (quantitative), and as a function of time with waveform. More specifically, the quantitative monitor provides a numeric value which is the end-tidal carbon dioxide ($EtCO_2$) plateau in phase 3.

A normal waveform displays several phases, and interpretation of this waveform can provide valuable information. Just like the various stages of an electrocardiogram represent different phases of the cardiac cycle, different phases of a capnogram correspond to different phases of the respiratory cycle. Knowing how to analyze and interpret each phase will contribute to the utility of capnography.

Capnography is most used in the prehospital setting to verify endotracheal tube placement and to monitor the effectiveness of CPR during cardiac arrest. It can also be a valuable tool to assess the clinical picture with other patient complaints.

ETT placement

Capnography used with visualization of the ETT passing through the vocal cords is the standard of care for confirming ETT placement during intubation. Capnography can also be easily applied to alternative airways like supraglottic devices. No matter which device is in use, capnography can provide immediate indication of the loss of proper position or function. Providers should continue to use $ETCO_2$ monitoring to reassess ETT location prior to and after patient movement.

Flattened waveforms are commonly seen with esophageal intubation, ETT obstruction, technical malfunction of the monitor or tubing, complete airway obstruction distal to the ETT, and prolonged cardiac arrest.

Cardiac Arrest

$EtCO_2$ monitors may give a low reading during the first few minutes of cardiac arrest. Though the body still makes CO2 during arrest, it will not reach the alveoli without circulating blood. As CPR increases circulation the EtCO2 should increase in a patient with a viable downtime. EtCO2 often gives the first indicator of ROSC as evidenced by an abrupt & sustained rise in the $EtCO_2$ level – a specific level is not required, but rather the sudden increase (usually at least 10 mmHg).

The EtCO2 level may help guide decision-making in assessing whether continued resuscitation in cardiac arrest is futile. Values < 10 mmHg after 20 minutes of active resuscitation have consistently demonstrated minimal chance of survival; however, EtCO2 should not be used as the only factor in the determine to cease resuscitation.

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[13] www.aliem.com/d50-vs-d10-severe-hypoglycemia-emergency-department/

[14] www.reliasmedia.com/articles/147052-ketamine-use-in-emergency-medicine

Respiratory Distress

Capnography can provide dynamic monitoring in patients with acute respiratory distress. Patients with acute obstructive disease processes of the lung (e.g. asthma, COPD, bronchitis) have bronchospasm that is produced a unique waveform shape – a "shark-fin appearance" – because of regional airway obstruction. Patients with respiratory distress from CHF typically do not have bronchoconstriction, so the waveform on their capnogram will not necessarily have the shark fin appearance unless the patient has a pulmonary comorbidity.

By analyzing the CO_2 waveform over time, medics can monitor the severity of asthma or COPD and the effectiveness of therapy provided. $ETCO_2$ values in asthma attacks will change depending on severity of the disease.

Early in an acute asthma attack, hyperventilation may occur, lowering $ETCO_2$ levels with a slightly abnormal waveform. As the attack progresses, the $ETCO_2$ may read in the normal range with a more prominent. looking shark fin waveform on the monitor. Finally, as the attack becomes severe, the $ETCO_2$ rises, and the wave becomes indistinguishable in its shark fin form. Once treatment is decided upon and bronchoconstriction decreases, the $ETCO_2$ number may increase initially as gas exchange improves. Recognize that the waveform will appear to be normalizing.

The return of a normal waveform indicates resolution of the bronchoconstriction. The same concepts will apply with a COPD patient; however, the initial numbers may be high due to retaining CO_2 in their disease process.

Other Capnography Indications

Waveform capnography is a direct measure of the changes in elimination of CO_2 from the lung and indirectly indicates changes in the production of CO_2 at the cellular level.

Monitoring $ETCO_2$ can provide an early warning sign of acidosis and/or shock and should be utilized on patients with suspected sepsis. A patient with low cardiac output from a shock state does not deliver as much CO_2 per minute back to the lungs to be exhaled, which will result in a decreased $ETCO_2$ regardless of any change in breathing rate.

Capnography should be used on all trauma and cardiac patients and any patient at risk for shock.

Capnography can also help paramedics optimize ventilation of intubated patients with head injury.

Hyperventilation of patients with increased intracranial pressure decreases intracranial blood flow, thereby increasing the risk of cerebral ischemia. Avoiding hyperventilation is associated with decreased mortality.

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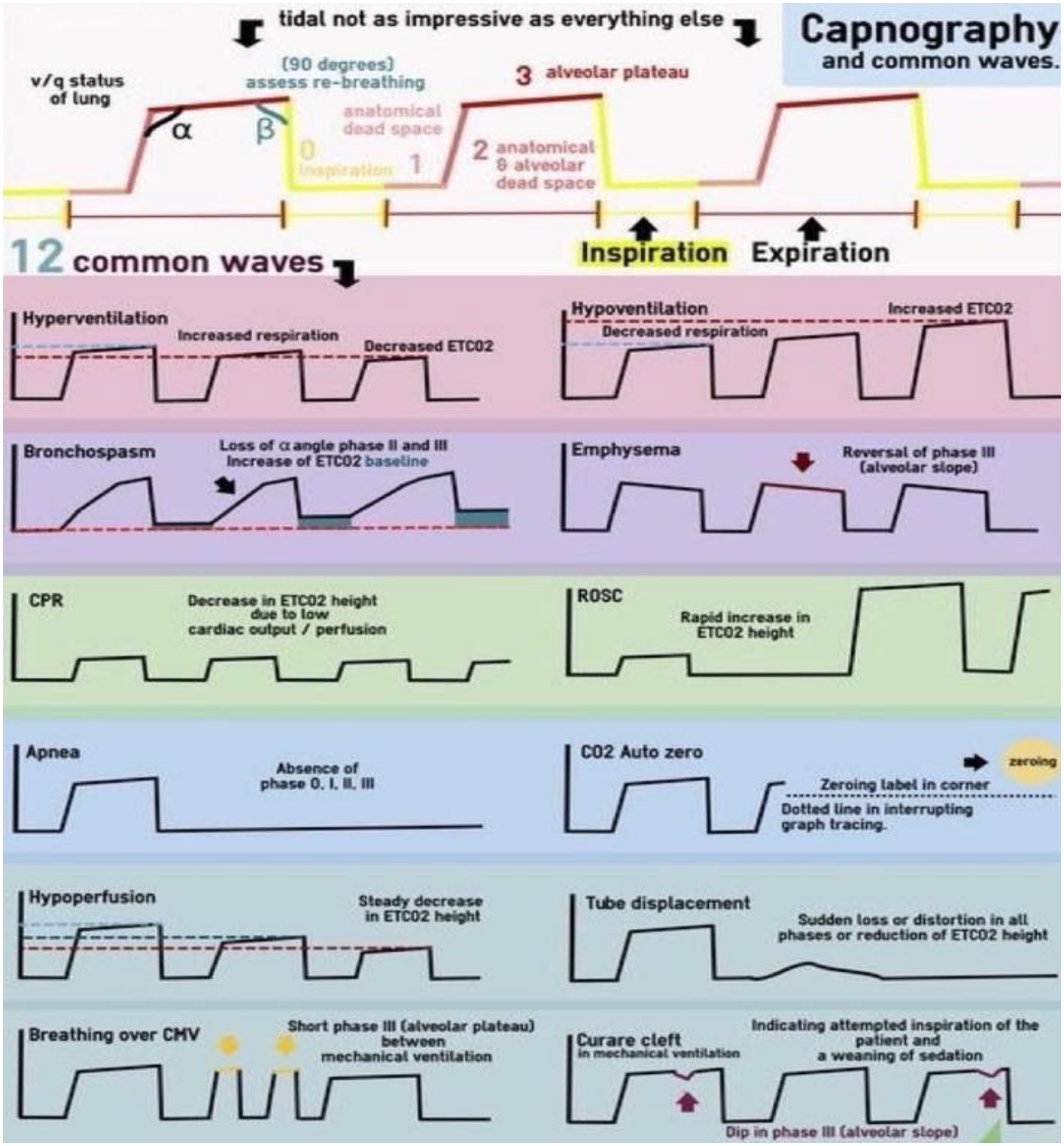
[15] http://www.emdocs.net/capnography-useful-ed-part/

[16] https://www.emsworld.com/article/10287447/capnography-clinical-tool


tidal not as impressive as everything else
Capnography
and common waves.
v/q status of lung
(90 degrees) assess re-breathing
α
β
anatomical dead space
0 inspiration
1
2 anatomical & alveolar dead space
3 alveolar plateau
Inspiration
Expiration
12 common waves
Hyperventilation
Increased respiration
Decreased ETCO2
Hypoventilation
Decreased respiration
Increased ETCO2
Bronchospasm
Loss of α angle phase II and III
Increase of ETCO2 baseline
Emphysema
Reversal of phase III (alveolar slope)
CPR
Decrease in ETCO2 height due to low cardiac output / perfusion
ROSC
Rapid increase in ETCO2 height
Apnea
Absence of phase 0, I, II, III
C02 Auto zero
zeroing
Zeroing label in corner
Dotted line in interrupting graph tracing.
Hypoperfusion
Steady decrease in ETCO2 height
Tube displacement
Sudden loss or distortion in all phases or reduction of ETCO2 height
Breathing over CMV
Short phase III (alveolar plateau) between mechanical ventilation
Curare cleft
in mechanical ventilation
Indicating attempted inspiration of the patient and a weaning of sedation
Dip in phase III (alveolar slope)

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Routine Medical Care

The following will be utilized on <u>all</u> medical emergencies – those requiring Basic (BLS) or Advanced (ALS) Life Support

- Ensure scene safety and BSI/PPE precautions[1]
- Consider need for additional resources
- Bring oxygen and equipment[2] to the patient
- Assess ABC's and ensure proper positioning of the patient
- Follow appropriate Spinal Precautions[3]

Patient assessment upon contact
Obtain initial vital signs[4]

Airway management +/- oxygen therapy[5] as clinically indicated
and in accordance with **Airway Management** guidelines

<u>If ALS:</u>
Apply cardiac monitor
Obtain SpO_2; consider $EtCO_2$
Consider 12-Lead EKG

<u>If ALS:</u>
IV/IO with Saline Lock if clinically indicated

Continue treatment as per appropriate guideline

As scene safety and conditions allow, routine medical care should be completed prior to moving the patient to the ambulance.

[1] Body substance isolation i.e. eye protection (goggles/face shield), respirator/surgical mask, gloves, gown

[2] Advanced airway equipment, suction, cardiac monitor, and departmental issued ALS gear

[3] According to **Spinal Motion Restriction** guideline

[4] Initial vital signs include: Blood pressure, heart rate, respiratory rate, pain scale, temperature and GCS

[5] Oxygen Flow Rates:
- Low Flow 2 lpm NC
- Supplemental 4 lpm NC
- High Flow 15 lpm NRB or BVM

Do Not Attempt to Resuscitate (DNAR)

Do not initiate resuscitation in the following situations prior to contacting Medical Control:

- Obvious signs of death
  - Body decomposition
  - Lividity
  - Rigor mortis
  - Fetal maceration
- Presence of legal documents stating resuscitation should be withheld
  - POLST (Physician Orders for Life Sustaining Treatment)
  - MOLST (Medical Orders for Life Sustaining Treatment)
  - Advanced Directive, Living Will, DNR
- Guidance from a healthcare proxy or power of attorney to withhold resuscitation in the absence of formal written directions
- Patient's personal physician is present at the scene and decides that resuscitation is not to be initiated[1]

↓

- Disturb as little evidence as possible in case it becomes a crime scene
- Obtain EKG rhythm strip showing asystole in at least two leads[2] (unnecessary if injuries are incompatible with life)
- Include EKG rhythm strip in patient care report (or document why it was not obtained)

↓

Document on-scene findings:

- Medical history
- Medications
- Last time patient was spoken to
- Trauma or deformity
- Unusual findings/circumstances
- Position found
- Skin temperature
- Pupils
- Names of significant bystanders

↓

Contact **Medical Control** for DNAR and/or Time of Termination[3]

[1] If the patient's physician decides that resuscitation should not be initiated, the on-scene should pronounce the patient after they have confirmed cessation of spontaneous circulatory and respiratory function. If the on-scene physician decides that resuscitation should be initiated, usual procedures should be followed (as per ROPE guidelines) unless the on-scene physician agrees to assume responsibility for patient care after discussion with the online Medical Control physician. See ROPE Introduction for further details.

[2] EKG electrodes may be placed posteriorly on patient's limbs if necessary

[3] Medical Control physicians are authorized to withhold or terminate resuscitation (DNAR) and to provide a Time of Termination (TOT). Physicians are not authorized to pronounce a patient (i.e. provide a Time of Death) unless they are present at the scene, have witnessed, and can confirm cessation of spontaneous circulo-respiratory function.

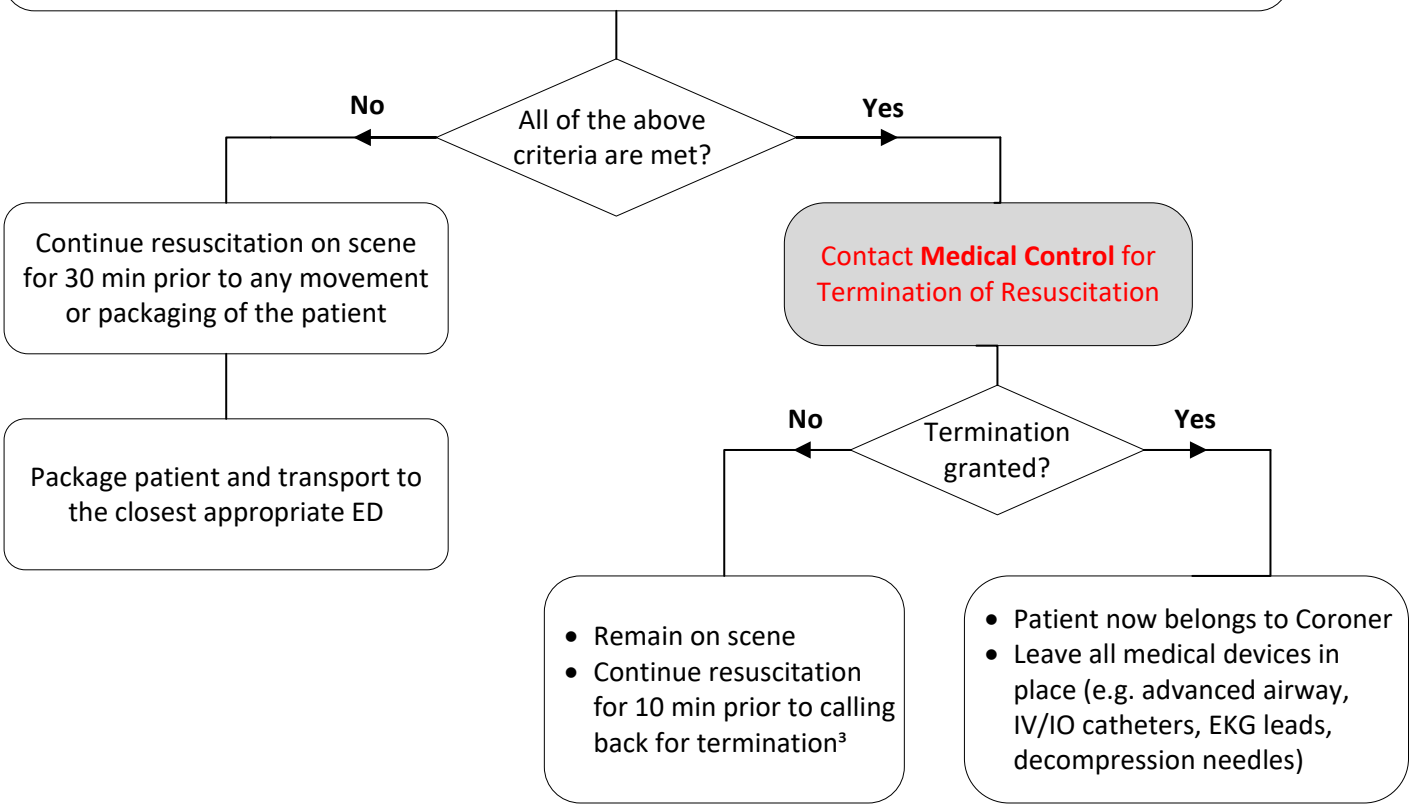
- For traumatic DNAR, see the **Adult Traumatic Prehospital Termination of Resuscitation** guideline.

Nontraumatic Termination of Resuscitation

EMS may transport any patient perceived to be viable or if scene dynamics or public perception necessitates transport. Provider safety takes precedence over length of on-scene resuscitation.[1]

ALL of the following **MUST** be met to consider Termination of Resuscitation

- **18 years of age or older**
- Pulseless and apneic prior to EMS arrival
- > 30 min of chest compressions with interruptions only for rhythm checks
- > 30 min resuscitation by an ALS provider following appropriate pulseless cardiac guideline[2]
- No suspicion of hypothermia
- Persistent asystole, agonal rhythm, or PEA < 40bpm without an identifiable reversible cause
- No ROSC at any time during resuscitation
- ETT or supraglottic airway in place with proper documentation of capnography (qualitative or quantitative)
- Patent IV / IO line
- Verification of proper BLS and ALS treatments by an on-duty paramedic and/or online medical director
- All EMS personnel involved in the patient's care agree that discontinuation of resuscitation is appropriate
- Patient's immediate family members on scene have been informed of the rational for termination
- A safe environment for EMS/first responders
- Law Enforcement/Coroner on scene or already notified



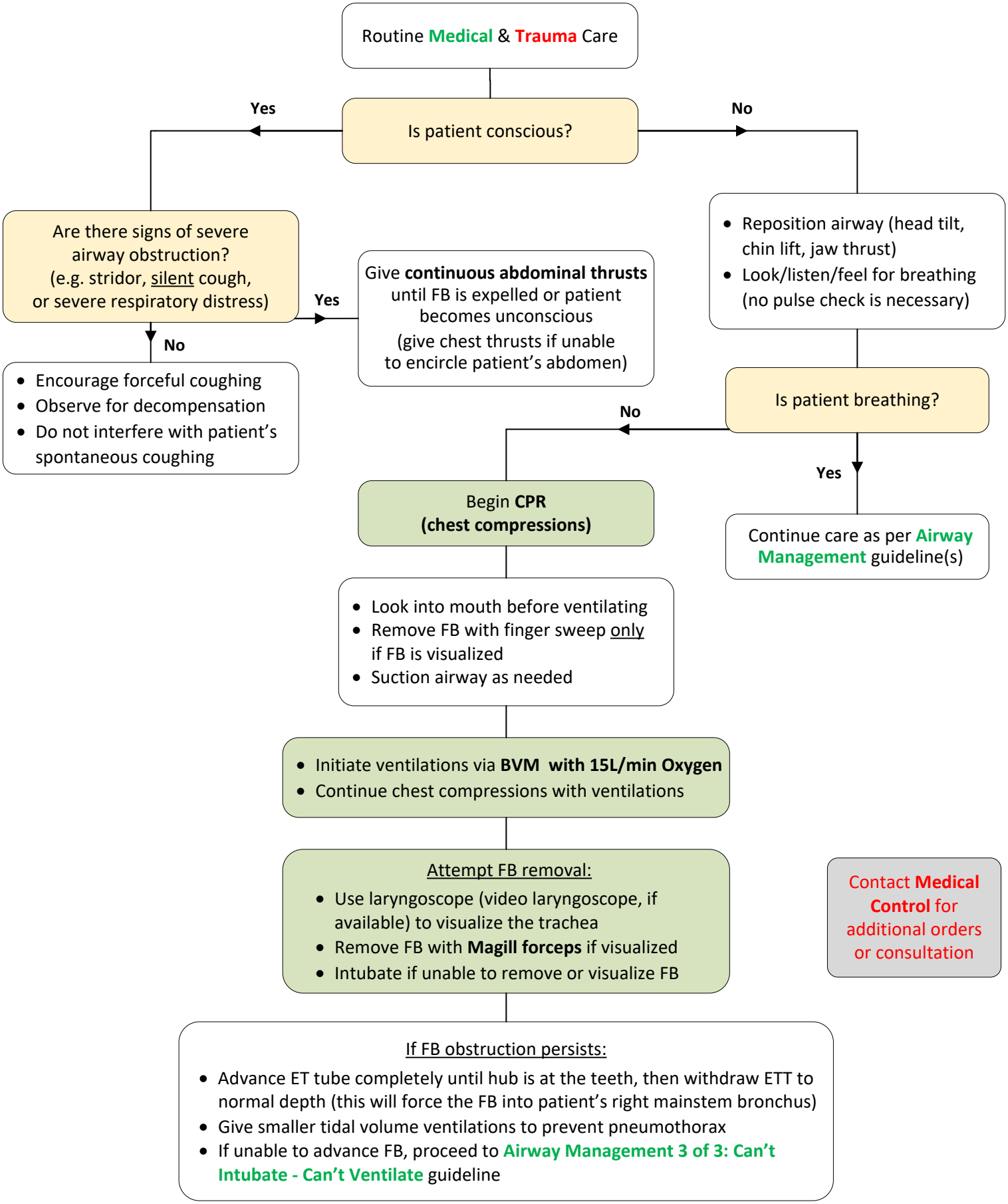
This guideline may only be executed by NRPs and AEMTs – it is not applicable to EMRs, EMTs

[1] If a scene has become too dangerous to provide patient care, law enforcement must be dispatched and providers must document the event in the patient care report.

[2] The following conditions may have a better outcome despite resuscitation efforts beyond 30 minutes & should be transported: hypothermia, lightning strike/electrocution, pregnancy with estimated gestational age > 20 weeks.

[3] If Medical Control does not grant "Termination" after two requests, transport to the closest appropriate ED.

Upper Airway Obstruction – Foreign Body (FB) Aspiration



Airway Management (1 of 3)

Initial Assessment

Routine Medical Care including SpO_2 and $EtCO_2$

Assess patient's ability to adequately oxygenate & self ventilate (i.e. maintain normal SpO_2 and $EtCO_2$)

Can Ventilate & Can Oxygenate

- Administer oxygen via nasal cannula or NRB
- Maintain SpO2 ≥ 94%

Is patient maintaining adequate oxygenation?

Yes → Continue to appropriate guideline based on patient signs/syptoms

No → Manage airway via **Can Ventilate & Can't Oxygenate**

Can Ventilate & Can't Oxygenate

Assist oxygenation[1]

- Non-invasive positive pressure ventilation (CPAP, BPAP)

<u>or</u>

- Bag-valve mask (BVM) with OPA/NPA as tolerated

[1] Choose least invasive manner first when able

Is respiratory distress improving after maximal noninvasive support?

Yes → Continue to appropriate guideline based on patient signs/syptoms

No → Prepare for Intubation

- Manage via **Can't Ventilate & Can Intubate** guideline
- Consider nasal intubation if patient is conscious

Continue to appropriate guideline based on patient signs/syptoms

Airway Management (2 of 3)

Nasotracheal Intubation

Prepare for Intubation[1]

- Insert NPA and preoxygenate[2] via BVM for 2min (right nare is typically larger)
- Consider benzodiazapine (**Midazolam** 2.5mg IV/IO or **Diazepam** 2-5mg IV/IO) for anxiety
- Consider **Ondansetron** 4mg IV/IO or **Droperidol** 1.25 mg IV to decrease aspiration risk

Perform Nasotracheal Intubation

- Attach BAAM® device to ETT; explain to patient importance of deep inspirations
- Advance lubricated ETT through nasopharynx and into oropharynx
- Listen for change in pitch via BAAM® – advance ETT when sounds are at their peak

- Confirm Tube Placement
  - Lung/Epigastric Auscultation; chest rise
  - $EtCO_2$ capnography (record waveform in ePCR)
- Secure nasotracheal tube with adhesive tape

Endotracheal Intubation

[1] Tools For Intubation

- Cuffed ETT
- 10-12 ml syringe
- Stylet
- ETT introducer (Bougie)
- Video Laryngoscope (if available)
- $EtCO_2$ detector
- Stethoscope
- Commercial ETT restraint

Prepare for Intubation[1]

- Insert OPA/NPA and preoxygenate for 3-4 minutes, if able
- Prepare for apneic oxygenation (NC @ 15L/min) during intubation
- Consider **Ondansetron** 4mg IV/IO or **Droperidol** 1.25 mg IV to decrease aspiration risk
- Consider suctioning airway prior to first intubation attempt

Preoxygenation and apneic oxygenation decrease hypoxia during intubation and subsequent cardiac arrest

Perform Endotracheal Intubation

- Remove OPA and advance ETT into trachea within 30 seconds
- Visualize ETT passing through the vocal cords (insertion qualifies as an attempt if ETT passes the teeth)

Confirm ETT Placement

- Lung/Epigastrium auscultation; chest rise
- $EtCO_2$ capnography (record waveform in ePCR)

Successful Intubation?

Yes

- Secure ETT with commercial ETT restraint device and document depth of ETT at level of patient's incisors
- Reconfirm ETT placement by using continuous $ETCO_2$ capnography
- Measure and apply cervical collar to patient
- Proceed to **Post-Intubation Advanced Airway Management**

No

- Reinsert OPA/NPA & oxygenate via BVM for 2 min
- Reattempt intubation using the ETT Introducer (Bougie) – max 2 attempts (1 attempt for trauma)
- Proceed to **Airway Management (3 of 3): Can't Ventilate and Can't Intubate** guideline

Airway Management (3 of 3)

CICO - Can't Ventilate & Can't Oxygenate

Confirm ventilation by observing chest rise and monitoring RR and $EtCO_2$ via capnography

- If not already done, attempt intubation ONCE by the most experienced provider
- Reinsert OPA/NPA; perform maneuvers to open airway
- Continue oxygenation via BVM (+/- PEEP valve)

Contact **Medical Control** for additional orders or consultation

Facial Trauma or Swelling?

No

Insert supraglottic airway (SGA) according to manufacturer guidelines

- Confirm adequate ventilation
- Return to using BVM if SGA insertion fails

- Continue to appropriate guideline
- Transport patient in line with routine procedures

Yes

Perform surgical airway (needle or surgical cricothyroidotomy) as outlined in **Advanced Practice** guidelines if approved by agency's Medical Director

- Confirm adequate ventilation
- Continue to appropriate guideline

Transport patient to the nearest Emergency Department for definitive airway management

Post-Intubation Advanced Airway Management

DOPES Mnemonic[1]

Displacement of ETT

Obstruction (e.g. mucus plug, kinked tube)

Pneumothorax, PNA, pulmonary edema, PE

Equipment failure

Stacked breaths (e.g. asthma, hyperventilation)

Provide post-intubation analgesia & sedation as needed

(1) Fentanyl 25-50mcg IV/IO q 2 min prn (max 200mcg)

+/ –

Midazolam 5mg IV/IO/IM q2min prn (max 20mg) or

Lorazepam 2–4mg IV/IM q2min prn (max 10 mg) or

Diazepam 5mg IV/IM q2min prn (max 10 mg)

(2) Ketamine 1mg/kg IV/IO/IM (may repeat x 1 in 10 minutes prn)

- Deliver ventilations with only sufficient volume to achieve chest rise (i.e. avoid hyperventilation); initial RR = 12 bpm
- Adjust ventilations based on patient's SpO_2 & $EtCO_2$
- Manage ongoing or sudden hypoxia using the DOPES mnemonic[1]

- Continuously monitor ETT placement during treatment & transport
- Document $EtCO_2$ value and record capnography waveform with each set of vital signs, when the patient is moved, and just prior to patient transfer in the ED

Adult Universal Respiratory Distress

Consider pulmonary & non-pulmonary causes:
pulmonary embolism, pneumothorax, pulmonary edema ("cardiac asthma"), MI, pneumonia, sepsis, metabolic acidosis (DKA, AKA), anxiety

Multiple causes can occur together and be contributing to a patient's symptoms.

Consider management of more than one condition and use more than one guideline when needed

Signs of Respiratory Distress

- SpO_2 <90%
- Nasal flaring
- Unable to speak sentences
- Supraclavicular/intercostal/ subcostal retractions
- Absence of wheezing with obvious SOB
- Apprehension, combativeness, anxiety
- Cyanosis
- Lethargy

The goal should be to **maximize oxygenation and ventilation regardless of the cause**

Consider CPAP early and anticipate possible deterioration needing advanced airway management

Routine Medical Care
including $Sp0_2$ & $EtCO_2$ monitoring

Is the airway patent?
- No → **Upper Airway Obstruction** guideline
- Yes

Are ventilations adequate? (based on condition, $EtCO_2$, and pathophysiology of disease)
- No → Support ventilation as per **Airway Management** guideline(s)
- Yes

Is anaphylaxis likely?
- Yes → **Anaphylaxis/Allergic Reaction** guideline
- No

Is wheezing present?
- Yes → **Wheezing** and/or **CHF/Edema** guideline
- No

Does patient have a known infection or display s/s of infection?
- Yes → **Shock** guideline
- No

- Maintain adequate oxygenation
- Obtain 12- lead EKG
- Continue to monitor for patient deterioration

Contact **Medical Control** for additional orders or consultation

Anaphylaxis | Allergic Reaction

Distinguish between anaphylaxis and non-anaphylactic allergic reaction[1]

Consider other specific guidelines – e.g. **Airway Management**, **Respiratory Distress**, **Shock**

Routine Medical Care

Determine Severity of Reaction

Non-Anaphylactic Allergic Reaction

Diphenhydramine 50 mg IV/IM

Patients with respiratory symptoms should receive IM Epinephrine – also consider giving Albuterol as outlined in **Wheezing** guideline

Anaphylaxis

Epinephrine 1mg/ml (1:1000) 0.3mg – 0.5mg IM (Thigh is preferred site) **May repeat x 1 after 5 min**

Diphenhydramine 50 mg IV/IO/IM

Crystalloid fluid bolus 1000 ml for SBP < 90 mm/Hg repeat x 1 prn

Give **Methylprednisolone** 125mg IV/IM/IO or **Dexamethasone** 16mg IV/IM/IO/PO[2]

Consider **Epinephrine Infusion** 2-30 mcg/min IV/IO as per **Shock** guideline

Contact **Medical Control** for additional orders or consultation

Non-Anaphylactic Allergic Reaction – symptoms involve only one organ system; generally consider a mild or moderate reaction

Anaphylaxis – more severe reaction that meets one of the following criteria:

A. Two or more body systems affected rapidly after exposure
- Skin involvement (rash, generalized itching)
- Mucosa involvement (angioedema, throat tightening sensation)
- Respiratory compromise (dyspnea, wheezing, stridor)
- Persistent GI involvement (vomiting, diarrhea, abd pain)
- Altered mental status, syncope, incontinence

or

B. Hypotension after exposure to a known allergen

Consider **Push Dose Epinephrine** while preparing vasopressor infusion

Mix in syringe 1ml of 0.1mg/ml (1:10,000) Epinephrine with 9 ml of NS (syringe = 10mcg/ml of Epinephrine)

Give 1ml IV/IO q3-5 min prn

- **The first-line treatment of anaphylaxis is epinephrine.** Consider immediate IM Epinephrine prior to IV/IO access in critically ill patients. Administration to the thigh is the fastest IM site – use either the vastus lateralus or the rectus femoris muscle. If patient has their own epinephrine auto-injector, the provider may assist them in using it. Corticosteroids are adjunctive therapy after epinephrine.
- IM administration of epinephrine is recognized as generally safe. Adverse cardiovascular events are most common when Epi is given IV. Consider the risks & benefits of Epi use in patients >60 yo or persons with a cardiac history. Consult **Medical Control** for guidance.
- Patients who take β-blockers have an increased risk of developing a more severe reaction; these patients also may have a paradoxical response to Epinephrine. The use of inhaled Ipratroprium (aka Atrovent) with Albuterol may help respiratory symptoms in these cases.
- A dystonic reaction (e.g. to phenothiazine) is NOT an allergic reaction; it is an adverse reaction. Patients may receive Diphenhydramine 50 mg IV/IM.

Wheezing/Bronchospasm

Consider pulmonary & non-pulmonary causes: pulmonary edema ("cardiac asthma"), MI, pneumonia, pulmonary embolism, pneumothorax

Obtaining a history is critical to identifying the cause of wheeze and severity of illness – if patient says they have been intubated in the past… BE PREPARED!

Routine Medical Care including SpO_2 and $EtCO_2$ monitoring

COPD patients not in respiratory distress should have a goal SpO_2 of >90%; however, do not withhold oxygen if patient c/o SOB or appears dyspneic

Give high-flow oxygen & dual therapy via nebulizer:

- **Albuterol Sulfate** 5mg
- **Ipratropium Bromide** 500mcg (i.e. 0.5mg)

Determine Level of Distress

Mild

Give **Albuterol** 5mg prn via nebulizer, may repeat x 1

Moderate

- Give **Albuterol** 5mg nebulized prn
- Give **Methylprednisolone** 125mg IV/IM/IO or
- **Dexamethasone** 16mg IV/IM/IO/PO[2]

Severe

- Look for tension pneumothorax if you haven't done so already
- Give CPAP early (max 5cm H_2O)
- Give **Albuterol** 5mg nebulized prn
- Give **Methylprednisolone** 125mg IV/IM/IO or
- **Dexamethasone** 16mg IV/IM/IO/PO[2]
- Consider **Magnesium Sulfate**[3] 2g IV/IO over 10 min (mixed in 100 ml NS or D5W)
- Consider **Epinephrine** 1mg/ml (1:1000) 0.3 mg – 0.5mg IM[4]

Contact **Medical Control** for additional orders or consultation

If Point of Care Ultrasound-POCUS is available consider use for differeniation of RAD vs Pulm Edema

Signs of Respiratory Distress

- SpO_2 <90%
- Nasal flaring
- Unable to speak sentences
- Supraclavicular/intercostal/subcostal retractions
- Absence of wheezing with obvious SOB
- Apprehension, combativeness, anxiety
- Cyanosis
- Lethargy

[1] Bronchospasm will cause the $EtCO_2$ (capnography) waveform to have a "shark-fin" appearance. The more pronounced the shark fin and the higher the $EtCO_2$, the greater the risk of respiratory failure. Treat aggressively, but manage airway in the least invasive way possible.

[2] It is safe to give the IV form of Dexamethasone orally. Remember, corticosteroids will not have an immediate effect – they will help resolve bronchospasm over hours and decrease hospital length of stay.

[3] Magnesium Sulfate may cause hypotension; be prepared to give patient a fluid bolus if needed. Consider the risk and benefits of its use prior to administering Magnesium Sulfate to patients with renal failure.

[4] IM administration of epinephrine is recognized as generally safe. Adverse cardiovascular events are most common when Epi is given IV. Consider the risks & benefits of Epi use in patients >60yo or persons with a cardiac history. Consult **Medical Control** if you need guidance.

Shock

[1] Manage primarily as guided in **Allergic Reaction/Anaphylaxis** guideline

[2] Don't forget to alert the hospital if you have a sepsis patient!

Routine Medical Care / Trauma Care
- Include temperature
- Look for associated injuries

Place 1 or 2 large bore IV's ≥ 18g
(consider IO after two unsuccessful attempts)

Consider etiology of shock state
See specific guideline

General Signs of shock
- Altered mental status
- Delayed/flash capillary refill
- Weak or decreased pulses
- Tachycardia
- Elevated RR
- Hypoxemia
- Hypotension for age
- Decreased urine output

[1]Anaphylactic | [2]Septic | Hypovolemic | Neurogenic

Crystalloid Fluid bolus:
Lactated Ringers 500mL
May repeat x 3 – 1500 ml MAX
Re-access Lung Sounds between bolus

Obstructive

- High flow O_2 via NRB
- Evaluate lung sounds
- Decompress tension pneumo- or tension hemopneumothorax

Cardiogenic

- Evaluate lung sounds
- **Crystalloid Fluid** bolus: 250-500ml if lungs sounds clear bilaterally

- Reassess vital signs, MAP, and Shock Index (SI)
- if persistent shock is believed to be due to hypovolemia, repeat **Crystalloid Fluid** bolus 500ml to a maximum of 2000mL

[3] May give **Push Dose Epinephrine** while preparing vasopressor infusion

Mix in syringe 1ml of 1mg/10ml Epinephrine with 9 ml of NS
(syringe = 10mcg/ml of Epinephrine)

Give 1ml IV/IO q3-5 min prn

[3] Consider Vasopressor Infusion:
Norepinephrine 2-12 mcg/min
or
Epinephrine 2-20 mcg/ming
titrate to MAP ≥ 65mmHg

Contact **Medical Control** to give steroids if patient has Addison's disease or other forms of adrenal insufficiency

Hypovolemic	Cardiogenic	Obstructive	Distributive
• Hemorrhage – trauma or medical (ex. GI bleed) • Vomiting/Diarrhea • Burns *get a good history*	• Heart Failure • Arrhythmias • Cardiomyopathy • Valvular Disease * look for clinical signs* Lung Sounds / Edema	• Tension pneumothorax • Hemopneumothorax • Massive PE • Cardiac tamponade *often have a narrow pulse pressure* **Pulse Pressure = SBP – DBP**	• Septicemia *look for source & fever* *may have a low $EtCO_2$* • Anaphylaxis *often warm/flush skin* • Neurogenic *usually h/o trauma* *often bradycardic*

Mean Arterial Pressure	Shock Index
MAP = SBP + (2 x DBP) / 3	**SI = HR/SBP** (SI >0.9 is poor)

Sepsis – Suspected / Septic Shock

Routine Medical Care

Vital Signs Including Temperature and Shock Index[1]

Obvious or Suspected Infection and **ANY TWO** of the following criteria:

- Respiratory Rate > 20
- Heart Rate > 90 /min
- Altered Mental Status GCS < 15
- Temp ≥ 100.4°F or < 96.0°F
- $EtCO_2$ ≤ 25mmHg

No

Routine Medical Care[2]

Patients with suspected sepsis may not have a low $EtCO_2$ reading.

Consider sepsis based on clinical presentation.

Yes / **No**

Consider Sepsis
Call **SEPSIS ALERT** to receiving ED

500mL fluid bolus w/ LifeFlow IV / IO Lactated Ringers with reassessment of Lung Sounds and Resp Rate*
*MAX 2 liters unless clinical concern for fluid overload

If SBP < 90 / MAP < 65 **AFTER** MAX 2L Bolus

Norepinephrine 2 – 12 mcg/min
or
Epinephrine 2-20 mcg / min

Cefepime 2000 mg IV x 1
***Do Not administer if pt has allergy to:
Penicillin – PCN
Cephalexin – Keflex ***

[1] Shock Index = HR / SBP. Normal Shock Index is between 0.5 and 0.7.

A SI > 0.9 is concerning for increased mortality.

HR should be < SBP

Criteria for consideration

- Immunocompromised
- Developmental Delay
- Cancer Patient
- Catheter – PICC or Foley
- S / S of poor perfusion
- Sickle Cell Patient

History:

- Age
- Fever
- Previous Infection
- Immunocompromised
- Bedridden / Immobilized patient
- Recent Surgery

Mean Arterial Pressure

MAP = (SBP + 2 x DBP) / 3

Reminder: Renal Failure [Dialysis] Patients are more likely to be fluid overloaded / CHF.

Consider use of POCUS if available.

Altered Mental Status

Potential Causes & Corresponding Guidelines

Alcohol	→	Drug Overdose
Epilepsy	→	Seizure
Insulin	→	Diabetic Emergency
Opiates	→	Drug Overdose
Uremia	→	*N/A (dialysis needed)*
Trauma	→	Traumatic Cardiac Arrest Traumatic Shock Head Injury
Temperature	→	Hypo-/Hyperthermia
Infection	→	Shock
Psychosis	→	Hyperactive Delirium with Severe Agitation
Stroke	→	Stroke
Seizure	→	Seizure

Routine Medical Care (including CO_2 & temperature)

Upper airway or respiratory compromise? — Yes → **Airway Management guideline(s)**

No

Signs of opiate/opioid overdose? — Yes → **Drug Overdose guideline**

No

Signs of shock?[1] — Yes → **Shock guideline**

No

Obvious signs of trauma? — Yes → **Routine Trauma Care & appropriate Trauma guideline**

No

Capillary Blood Glucose (CBG) < 60 mg/dl — Yes → **Diabetic Emergency guideline**

No

History of agitation or erratic behavior? — Yes → **Hyperactive Delirium with Severe Agitation guideline**

No

Recent or current seizure activity? — Yes → **Seizure guideline**

No

Positive Cincinnati Prehospital Stroke Scale? — Yes → **Stroke guideline**

No

Consider other causes of AMS:
e.x. encephalopathy, dysrhythmia, hypoxia, hypercapnea, CO poisoning, toxiciology

Consider restraints (chemical and/or physical) EARLY for the safety of the patient and the provider

[1]**Shock** is defined as impaired tissue perfusion and may be manifested by any of the following:

- Altered mental status
- Tachycardia
- Poor skin perfusion
- Low blood pressure

Maintain a high index of suspicion. Traditional signs of shock may be absent early in the process.

Contact **Medical Control** for additional orders or consultation

Overdose | Acute Poisoning

Routine Medical / Trauma Care
Including $EtCO_2$ and SpO_2
(ensure adequate oxygenation/ventilation)

Look for associated injuries/illnesses
Consider **Spinal Motion Restriction**, if trauma suspected

Ask for:
Time of ingestion
Dose of ingestion
Quantity of Ingestion

Look for:
needle marks, bites, bottles, paraphernalia, trauma, weapons

If needed, call national **Poison Control Center**
1-800-222-1222

Assess Blood Glucose,
If ≤ 60 mg/dL → **Diabetic Emergency** guideline

↓LOC, compromised respiratory function, and/or significant hypotension?

No → Supportive Care; contact **Medical Control** as needed

Yes

Signs of Compromised Respiratory Function
- SpO2 < 94%,
- Drooling
- Shallow respirations
- RR ≤ 10/min
- Rising $ETCO_2$ above patient's baseline

- Naloxone if suspected opiate overdose[2] (heroin, pain medications)
  Naloxone 2mg IN
  or
  Naloxone 0.5mg IV/IM/IO
  q2min prn (max 4mg)
- Fluid bolus if hypotension: **NS/LR** 500 ml IV/IO

Consider chemical sedation and/or physical restraints

Obtain 12 Lead EKG

Determine & treat cause of overdose/poisoning

Alcohol
NS/LR fluid bolus IV prn (max 2L)

Phenothiazines (dystonic reaction)
Diphenhydramine
25 – 50 mg IV/IO/IM

ASA, Tricyclics, or Unknown Med with widened QRS > 120ms[3]
Sodium Bicarbonate
1-2mEq/kg IV/IO
repeat prn until QRS < 120ms

Ca^{2+} Channel Blocker[4]
Calcium Chloride
500-1000mg IV infusion over 10-20 minutes

Stimulants (cocaine, PCP, meth, bath salts)
Benzodiazepines for agitation as per **Agitated/Combative or Hyperactive Delirium with Server Agitation** guideline

Carbon Monoxide
O_2 @ 15 L/min via NRB
Measure CO, if able, as per **CO** guideline

SSRIs, MAOIs, Benzos, Barbituates, APAP, or Beta Blockers[4]
NS/LR fluid bolus IV prn (max 2L)
Contact **Medical Control** for additional orders

[1] Patients with altered mental status **cannot** be clinically cleared from a cervical collar

[2] Administer Naloxone until mentation improves and adequate ventilation/oxygenation is confirmed by RR, SpO_2, and $EtCo_2$. IV doses greater than 0.5mg increase the risk of flash pulmonary edema – this chance increases in proportion to the administered dose. Synthetic opioids (e.g. fentanyl, carfentanil) tend to require doses greater than 2mg.

[3] Symptoms include abnormal breathing, focal seizures, coma, AV blocks, ventricular arrhythmias, QRS >120ms, dominant R wave in aVR

[4] Antihypertensive and antiepileptic overdoses frequently cause hypotension.

Diabetic Emergency

Routine Medical Care
(including temperature)

Assess Blood Glucose

CBG ≤ 60mg/dL

Oral Glucose[1] (given by EMT, AEMT or NRP)
or
Dextrose 50% 12.5g – 25g IV/IO
(25g = 50 ml)
or
Dextrose 10%[2] 12.5g – 25g IV/IO
(25g = 250 mL)

- Repeat CBG if altered LOC persists and treat accordingly
- Look for other causes of altered LOC if maximal doses of dextrose do not correct patient's mental status[3]

Contact **Medical Control** if further orders are needed.

Asymptomatic hyperglycemia[5] does not require treatment.

Hypoglycemia always requires treatment

When unable to obtain a reading then assume CBG is low if patient is altered & takes insulin

CBG > 250mg/dL and signs of ketoacidosis

Crystalloid fluid bolus 1000ml IV/IO

12-Lead EKG
(assess for ACS and/or hyperkalemia[4])

Reassess patient for fluid overload & cerebral edema

Repeat **Crystalloid fluid bolus**
1000 ml IV/IO prn x1

Additional **Crystalloid fluid** for extended transports as ordered by **Medical Control**

Consider refusals after hypoglycemia only if **ALL** of the following are true:

- Repeat CBG > 80mg/dL
- Patient returns to normal mental status
- A clear cause of hypoglycemia has been identified (e.g. missed a meal)
- Patient has no other symptoms (e.g. chest pain, SOB, intoxication, seizure)
- Patient only takes metformin and/or insulin
- Patient can promptly obtain and eat a meal
- A reliable family member is present that can reactivate 911 if needed

Signs of Ketoacidosis

- Ill appearance
- Dyspnea
- Deep rapid (Kussmaul) respirations
- Tachycardia +/- weak pulses
- Nausea or vomiting
- Abdominal pain or cramping
- Headache or double vision
- Altered LOC
- Fruity/acetone breath or odor
- Muscle wasting or weight loss
- Flushed/dry skin, skin tenting
- Dry mucous membranes

Remember other causes of ketoacidosis – ex. starvation & alcohol
Common theme: absent and/or unrecognized elevated glucose levels
Common prehospital treatment: crystalloid fluids

[1] Oral glucose/carbohydrates (including items in the patient's home) may be provided if there is no risk of aspiration related to the patient's mental status.

[2] To make **Dextrose 10%**: Dilute 50 mL **Dextrose 50%** in 200 mL of **NaCl** – makes 250 mL of **Dextrose 10%.** Titrate to effect.

[3] Ask or look for an insulin pump on your patient. It should not be disabled unless hypoglycemia cannot be corrected – contact Medical Control for approval to disable.

[4] EKG changes of hyperkalemia: peaked T waves, long PR interval, widened QRS complex, loss of P wave, sine wave, asystole

[5] Look for causes of hyperglycemia - the I's: **I**nfection, **I**nsufficient **I**nsulin, **I**schemia (i.e. acute MI), and **I**t's new-onset diabetes.

Stroke

Cincinnati Stroke Scale
- Facial Droop
- Arm Drift
- Speech Deficit

VAN Assessment

Weakness + one of the following:
- Visual Disturbance: field cut, double vision, new blindness
- Aphasia: inability to speak or understand
- Neglect: forced gaze, ignoring one side, unable to feel on both sides at the same time

- Routine Medical Care
- Look for signs of trauma[1]

Supplemental **Oxygen** to keep $SpO_2 \geq 93\%$

Assess blood glucose
if CBG < 60 mg/dL
Dextrose 50% 12.5g IV (25ml)
or
Dextrose 10% 12.5g IV (125ml)
(per **Diabetic Emergency** guideline)

All new onset neurological complaints consistent with stroke should be treated by EMS as a **"Stroke Activation"**

IV thrombolytic and/or mechanical clot retrieval may be indicated for patients with large vessel occlusion (i.e. VAN+)

Decisions about a patient's eligibility for treatment will be made at the receiving facility based on history, exam, and radiologic findings.

Do NOT treat Hypertension

Critically ill patients with compromise of airway, breathing, or circulation **may** be transported to the closest ED

- Assess initial neurological function using the **Cincinnati Stroke Scale** exam.
- Determine when "Last Seen Normal"[2] and document specific time (e.g. "LSN 13:30" not "1 hour ago")

Quick & efficient transport is critical. When able, also transport a family member or friend who has pertinent medical information

VAN positive and LSN ≤ 24 hours[2,3]

Assess for Large Vessel Occlusion stroke (LVO) using the **VAN** Assessment

VAN positive & LSN > 24 hours[2,3]
or
VAN negative

If **< 15 minutes of additional transport time** to reach CSC, TSC, or EC-PSC then transport to it

If > 15 min transport additional transport time

Transport to closest appropriate facility that is not a Bypass Hospital

Position patient supine for transport. If aspiration risk or decreased LOC, Elevate the head of the stretcher 30°

Receiving ED MUST be contacted as early as possible for prehospital "**Stroke Activation**" - notify hospital of LSN time

LOUISIANA EMERGENCY RESPONSE NETWORK

Reference LERN Protocols / Guidelines for further clarifications

[1] If patient has associated trauma and GCS ≤ 13, treat per *Head Injury* trauma guideline and consider transport to a Trauma Center - *ABCs before D*

[2] Last seen normal (LSN) is the time the patient reports being in normal state. If patient is unable to provide history, LSN is last seen in a normal state as stated by a bystander. If patient was awake at the time of symptoms onset or the acute deficit was witnessed, last normal = time of stroke onset (TSO).

[3] Patients with an unclear time of onset, i.e. "Wake-Up" strokes, should be treated with the same urgency as those with a clear TSO. Some patients will have MRIs showing they are eligible to receive emergent treatment - IV thrombolytic +/- mechanical clot removal (i.e. thrombectomy).

[4] **CSC = Comprehensive Stroke Center (fka Level 1). TSC = Thrombectomy Stroke Center (new designation). PSC = Primary Stroke Center (fka Level 2). EC = Endovascular Capable (i.e. thrombectomy able)**. Traffic delays should be considered when factoring in time of transport.

- Consideration for stroke mimics (e.g. hypoglycemia, seizure, sepsis, migraine, intoxication) should not change a provider's choice in hospital destination. Transport based on the most immediate life-threatening or disabling condition… that will usually be the stroke.

Seizure

Signs of Eclampsia

- SBP >160, DBP >110
- Confusion
- Pulmonary edema
- RUQ or epigastric pain
- Seizures

Common Seizure Types

Tonic-clonic: a regular pattern of contraction and extension of the arms and legs

Absence seizures: brief loss and return of consciousness, generally not followed by a period of lethargy

Complex partial seizures: focal seizures with altered mental status (as opposed to simple partial seizures where the level of consciousness is normal)

Routine Medical Care

Is patient > 20 weeks pregnant (uterus appears above umbilicus) or < 6 weeks postpartum?

Yes

- Give **Magnesium Sulfate** 4mg IV/IO in NS or D5W infusion over 10 minutes
- Refer to **Obstetric Complication** guideline

No

Is patient seizing?

Yes

Adminster **Midazolam** 10mg IM if IV access not already obtained (even if seizing stops before injection)

- Check capillary blood glucose
- Treat hypoglycemia if CBG < 60mg/dl per **Diabetic Emergency** guideline
- Obtain IV access

Is patient seizing after 5 min?

Yes

- Give Benzodiazepine (Midazolam is 1st choice if available)
  - **Midazolam** 2.5mg IV/IM/IO (max dose = 10mg) or
  - *does not include initial IM dose if seizing upon arrival*
  - **Diazepam** 5mg IV/IM/IO (max dose = 10mg) or
  - **Lorazepam** 2mg IV/IM/IO (max dose = 8mg) or

  Repeat q2min until max dose or seizure stops

  * NOTE: Diazepam & Lorazepam should not be given intranasally

  ****After reaching max dose of Midazolam ****
  - Consider **Ketamine** 1 mg/kg IV/ IM (max dose = 300 mg)
- Provide oxygenation if status epilepticus present; titrate to maintain SpO_2 > 94%
- Prepare for assisted ventilations, as needed, once patient is post-ictal

No

- Look for signs of trauma and/or head injury
- Obtain IV access prior to transport

No

- Check capillary blood glucose
- Treat hypoglycemia if CBG < 60mg/dl per **Diabetic Emergency** guideline
- Obtain IV access

Contact **Medical Control** for additional orders or consultation

Generalized or complex partial seizure activity begins in the presence of EMS?

Yes

- Magnesium Sulfate should be used as the first-line treatment for eclampsia and should be given prior to benzodiazepines.
- Transport all new onset seizures to an ED with a functional CT scanner. If seizure is secondary to trauma, transport to a Trauma Center
- Transport pregnant patient on the left side or manually displace the uterus to the left to facilitate blood return to the heart
- Status epilepticus is defined as continuous seizure activity for 5 minutes or more without return of consciousness, or recurrent seizures (2 or more) without an intervening period of neurologic recovery. Status epilepticus should be treated for all seizure types where consciousness is lost even briefly (e.g. absence). Simple partial status epilepticus does not require repeat doses of benzos.

Agitated/Combative Patient

Do not attempt to enter or control a scene where physical violence or weapons are present. Dispatch law enforcement immediately. Maintain scene safety and leave the scene if it becomes unsafe at any point.[1]

Routine Medical / Trauma Care

- Provide verbal reassurance
- Use calming techniques
- Establish rapport with patient

Look for medical causes of agitation[4]

- Obtain CBG and temperature
- Apply cardiac monitor
- Perform 12 lead EKG

[4] Medical Causes of Agitation

- Hypoxemia
- Head trauma
- Post-ictal state
- Hypoglycemia
- Drug Overdose
- Drug withdrawal
- Chronic mental Illness
- Hyperactive Delirium with Severe Agitation
- *AEIOUTIPS*

Do not agitate patient with a prolonged exam

Consider restraints[2] early if patient has ANY of these:

- Easily agitated
- Verbal outbursts
- Sudden mood changes
- Aggressive behavior
- Hallucinations
- Delusional thoughts
- Suicidal or homicidal thoughts

Does patient have signs of Hyperactive delirium with severe agitation?[5]

No

Sedate with a benzodiazepine:

Midazolam 2.5-5 mg IM/IV/IN (max 10mg)
or
Diazepam 5mg IV or 10mg IM (max 10 mg)
or
Lorazepam 2mg IV or 4 mg IM (max 8 mg)

Note:Diazepam & Lorazepam cannot be given IN

If agitation persists after 5 min:

Repeat **benzodiazepine** if max dose not already reached[3]

Contact **Medical Control** if additional sedation is needed

[5] Signs of Hyperactive delirium with severe agitation:

- High body temperature
- Profuse sweating
- Incoherent speech
- Dilated Pupils
- Nakedness
- Running into traffic
- Mirror/glass attraction
- Inconsistent breathing
- Instant tranquility

Yes

Proceed to **Hyperactive delirium with severe agitation** guideline

- High-flow O_2 via NRB mask
- $EtCO_2$ Monitoring
- Anticipate respiratory depression and need for ventilatory support

- Monitor VS – especially LOC, $EtCO_2$, and EKG rhythm
- If temp > 104°F, cool via **Hyperthermia (Heat Stroke)** guideline

[1] In case of threat during transport: Stop, Communicate your location/needs, Stand (with your partner). Provider safety 1st!

[2] Secure all four extremities to maximize safety. Placement of the stretcher in sitting position prevents aspiration and reduces the patient's strength by place the abdominal muscles in flexed position. Restraints should not restrict chest wall motion, compress the neck, or compromise the airway.

[3] Cocktails/mixtures of drug classes should be avoided to prevent complications, including arrhythmias and respiratory depression.

Hyperactive Delirium with Severe Agitation

Use of this guideline should trigger concern for shock, respiratory distress, and/or cardiac arrest.
The goal is to limit patient exertion, inhibition of chest wall/diaphragm during respirations, and time being restrained.
Prolonged struggle increases the chance of patient death.

[5]Signs of Hyperactive delirium with severe agitation:

- High body temperature
- Profuse sweating
- Incoherent speech
- Dilated Pupils
- Nakedness
- Running into traffic
- Mirror/glass attraction
- Inconsistent breathing
- Instant tranquility

Approach patient calmly
Attempt verbal de-escalation
Remove/limit unnecessary stimulation

Routine Medical / Trauma Care

Sedate with a single agent:

(1) **Midazolam** 5mg IV/IM or
Lorazepam 4mg IV/IM or
Diazepam 5mg IV/IM or
(2) **Ketamine** 4mg/kg IM
(max IM dose = 300mg)
or
(3) **Droperidol** 5 mg IM

Cocktails/mixtures of drug classes place the patient at increased risk of arrhythmias and respiratory depression

If agitation persists after 5 min,
sedate with same class of drugs as initial agent:

(1) Repeat **benzodiazepine** at the **same** dose
(2) Repeat **ketamine** at **half** of the initial dose
do not crossover/mix drug classes

- Apply cardiac monitor (including $EtCO_2$ monitoring) ASAP
- Give high-flow O_2 via NRB mask
- Anticipate respiratory depression and need for ventilatory support

Give cold **Crystalloid Fluid bolus** 1L IV/IO
if no indication of CHF or pulmonary edema

- Measure temperature; cool via **Hyperthermia** guideline if > 104°F
- Look for underlying medical cause(s) of altered mental status

Patients with Hyperactive delirium with severe agitation are presumed to have a catecholamine surge, either exogenous (ex. drugs), endogenous (ex. sepsis, head injury, hypoxia), or a combination of the two (ex. exertion + cocaine).

This is a medical issue, not behavioral. Patients are likely to develop hyperthermia and severe acidemia due to lactic acidosis.

Hyperthermia has a strong association with mortality.

"Instant tranquility" should also be considered a sign of impending arrest.

For suspected or known underlying psychiatric issues or psychostimulant use or hyperthermia administration of Benzodiazepines or Droperidol is preferred to Ketamine

Contact **Medical Control for** additional sedation or consultation

- Keep it simple. Psychotic & stressed patients do not process complicated messages. Do not irritate the patient with a prolonged exam.
- Coordinate closely with law enforcement and aim to initiate sedation at the same time as physical restraints. Restraints should not restrict chest wall motion, compress the neck, or compromise the airway. Never restrain patient in prone position.

  If an hyperactive delirium patient experiences cardiac arrest, they should be given **Sodium Bicarbonate** (2 ampules) early in resuscitation followed by 1 ampule (50mEq) every 10min during the remainder of the resuscitation.
- Tonic-clonic movements are common after the administration of ketamine. They should not be confused with an emergence reaction which usually includes hallucinations, flashbacks, or irrational behavior mixed with periods of lethargy.

Non-Traumatic Abdominal Pain | Nausea & Vomiting

Routine Medical Care (including temperature)

Is the patient ≥ 40 years of age with three or more cardiac risk factors?

No → Treat signs/symptoms - provide supportive care

Yes → Obtain 12-Lead EKG

Consider IV/NS Lock[1]

- Consider etiology of symptoms
- Evaluate for dehydration +/- shock

Crystalloid fluid bolus 500ml IV/IO prn for dehydration(max 2L)

Nausea or vomiting?

Ondansetron 4mg IV/IO/PO prn (max 8 mg)
** It is safe to give IV form orally, if tolerated ** or
Droperidol 1.25 mg IV **exclude ages >65yo and <12yo**

Consider **Fentanyl** 25-50 mcg IV/IO/IN/IM prn for severe pain[2] concerning for a surgical pathology (max 100mcg) or **Ketorolac [Toradol]** 15mg IV/IM **Do Not Utilize on RENAL or GI Bleed Patients **

Contract **Medical Control** if further orders are needed

Cardiac Risk Factors

- Smoking (current or cessation ≤ 3mo)
- Obesity
- Diabetes Mellitus
- Hypertension
- High Cholesterol
- Cardiovascular disease
- Family history (parent or sibling with CVD before 65yo)

Manage shock primarily as instructed in **Shock** guideline

Surgical Pathology

- Appendicitis
- Cholecystic

Cancer and Sickle Cell patients may receive additional **Fentanyl** IV/IO/IN/IM **MAX DOSE 200 mcg** for pain management

Possible Causes of Abdominal Pain

Obtain a thorough history (SAMPLE/OPQRST) to help identify etiology (e.g. last BM, last menstruation, h/o hernia, etc)

- Myocardial infarction °
- CHF °
- Aortic dissection °
- Aortic aneurysm °
- Bowel ischemia °
- Bowel obstruction
- GI Bleed[1]
- Pneumonia/PE
- DKA
- Gastroenteritis
- Peptic ulcer disease/gastritis
- Pancreatitis
- Diverticulitis
- Appendicitis
- Pregnancy (including ectopic)
- Pelvic disease (PID, cyst)
- Bladder/prostate disorder
- Kidney stone
- Gallbladder disease
- Liver disease

° Consider in patients with cardiac risk factors, especially the elderly

[1] Start two, large bore IVs if GI bleed is suspected

[2] Research has shown that analgesia does not interfere with the evaluation of an acute abdomen. Avoid opiates in patients who are pregnant or who have dental pain, chronic pain (not on hospice), or care plans that prohibit the use of narcotics.

Drowning

Coordinate rescue efforts between all responding agencies to ensure patient is rapidly accessed and removed from the water. Initiation of in-water ventilations may increase survival. In-water chest compressions are futile.

Routine Medical/Trauma Care

- Look for associated injuries
- Consider **Spinal Motion Restriction**[1]

Once patient is in shallow water, open airway and evaluate respiratory function

Respiratory Distress

- Give high flow oxygen (10-15 lpm) via NRB
- Maintain SpO2 > 93%
- Evaluate oxygen & ventilation as outlined in **Airway Management** guidelines

<u>If fluid is auscultated (i.e. rales) in the lungs:</u>

- **Albuterol** 5mg via nebulizer q5min prn x 3
- **CPAP** up to 10 cmH_2O PEEP, as needed

- Insert IV Saline Lock
- Monitor/Treat hypoperfusion as per **Shock** guideline
- Continue to monitor respiratory status; be prepared for deterioration

Respiratory / Cardiac Arrest

- Give five rescue breaths – this can be done while patient is still in the water[2]
- Once patient is out of the water, begin chest compression and apply defibrillator pads to the patient's dry chest
- Perform early & aggressive airway management with intubation
  - Anticipate the patient needing suction
  - Consider using a PEEP valve (5-10 cm H_20) if persistent hypoxemia is present
- Follow appropriate **Cardiac Arrest** or **Hypothermic Cardiac Arrest** guideline[3]

Contact **Medical Control** if additional orders or consultation is needed

[1] Unnecessary spinal motion restriction can impede adequate opening of the airway and delay delivery of rescue breaths. Routine spinal motion restriction in the absence of circumstances that suggest a spinal injury is not recommended.

[2] Cardiac arrest from drowning is due primarily to lack of oxygen. <u>It is important that CPR follow the traditional ABC sequence not CAB.</u> Five initial breaths (as opposed to two) are recommended because the initial ventilations can be more difficult to achieve due to water in the airways interferes with effective alveolar expansion.

[3] Paramedics should use sound clinical judgment when deciding if resuscitation efforts should be initiated. If water temperature is < 43°F, survival is possible in patients submerged up to 90 minutes. If water temperature > 43°F (6°C), survival is more likely when patient is submerged < 30 minutes. If there is any doubt or if the events leading to the submersion are unclear (e.g. traumatic injury), it is recommended that resuscitation be initiated and the victim be transported to an ED unless there are obvious signs of death (see **Do Not Attempt to Resuscitate** guideline).

Hyperthermia | Heat Exposure

Hyperthermia increases heart demand and can cause dysrhythmias, acute MI, and heart failure. Monitor closely.

Routine Medical Care / Trauma Care

- Include temperature & CBG
- Apply cardiac monitor
- Look for associated injuries/illnesses
- Consider *Spinal Motion Restriction,* if needed

Ice Bath Immersion is critical for exertional heat stroke. Consider staying on-scene longer if it is rapidly available.

Move victim to a cool or shaded area
Remove clothing and loosen restrictive garments
Apply cold packs to the axilla, groin, and posterior neck

Heat Exhaustion

- Normal mentation
- Elevated body temperature
- Cool, moist skin
- Headache
- Generalized weakness
- Nausea/Vomiting
- Possible syncope
- Aches in legs or abdomen (i.e. heat cramps)

PO Fluids[2]
as tolerated

Crystalloid Fluid if unable to tolerate PO
500mL IV/IO prn (max 2L)
Goal: MAP ≥ 65 or as clinically indicated for dehydration

Differential Diagnosis

Hyperactive Delirium with severe agitation
Delirium Tremens (DTs)
Hyperthyroid Storm
Fever/Infection
Exercise/Exertion
Neuroleptic Malignant Syndrome (often due to antipsychotics)
Sympathomimetic OD (ex. cocaine, amphetamines)
Anticholinergic Toxidrome (ex. antihistamine OD)
CNS lesion/tumor

Contact Medical Control if additional orders are needed

Heat Stroke

- Altered L.O.C.
- Very high body temperature (likely > 104°F)
- Hot, dry skin
- Sweating may have stopped
- Tachypnea
- Hypotension
- Seizures
- Coma

Ice Bath Immersion[1]
(If available on scene)
-OR-
Evaporative Cooling

- Fan the patient
- Mist skin with tepid H_20

Crystalloid Fluid
500mL IV/IO PRN, Max of 2L
Goal: MAP ≥ 65 or as clinically indicated for dehydration

Look for other causes of altered LOC using **Altered Mental Status** guideline[3]

[1] Ice baths are often available at commercial sporting events. Consider using a KED to assist with placement/removal of patient into bath.

[2] PO fluids of choice are sports drinks/products with electrolytes

[3] Treat generalized seizures with benzodiazepines as outlined in **Seizure** guidelines

Cooling efforts – including ice bath immersion - should continue until body temperature is less than 102.2°F (39°C) and patient displays improvement in mental status. Further cooling risks inducing overshoot hypothermia.

Hypothermia | Cold Exposure

Hypothermia may be primary (i.e. due to increased loss of heat) or secondary (i.e. due to another condition causing decreased heat production). Consider secondary causes in your differential diagnosis: sepsis, toxins, psychiatric illness, hypoglycemia, hypothyroidism, CNS dysfunction (e.g. stroke, head injury)

Early signs of Frostbite/Frostnip
- Numbness
- Clumsy feeling in affected part
- White, blanched skin

Late signs of Frostbite/Frostnip
- Dark, hard, woody skin
- Decreased or loss of sensation
- Bruising or blistering skin

Routine Medical Care / Trauma Care[1]
- Include temperature & CBG
- Look for associated injuries/illnesses
- Consider **Spinal Motion Restriction**, if trauma is suspected

Hypothermia can occur even in normal temperatures

Clinical classification:
- **Mild**: normal mental status, shivering, normal VS including body temp 32.1-35°C (89.8-95°F)
- **Moderate/Severe:** altered LOC, no shivering, ↓BP, ↓HR, ↓RR, temp <32.1°C (89.8°F)

Remove wet garments & dry patient

Determine Severity of Exposure

Localized Cold Injury (frostbite, frostnip)

- Dress injured area in clean cloths
- Do not rub skin
- Do not break blisters

- Monitor for signs of worsening hypothermia
- Consider transport to a Burn Center for frostbitten extremities

Contact **Medical Control** if additional orders are needed

Systemic Hypothermia

Is patient alert?

Yes
- Cover patient with dry sheets or hypothermic blanket(s); apply hot packs[3] if available
- **Obtain 12-lead EKG[2]**
- Start IV, apply cardiac monitor
- Monitor VS, including EtCO2
- **Do not allow patient to walk or stand**
- Transport to local facility

No

Is there a pulse?[2]

Yes
- Cover patient with dry sheets or hypothermic blanket(s); apply hot packs[3] if available
- **Obtain 12-lead EKG**
- Start IV, apply cardiac monitor
- Monitor VS, including EtCO2
- **Consider/treat causes of Altered Mental Status**
- Transport to local facility

No
- Limit patient movement
- Initiate CPR
- Treat as per **Hypothermia Induced Cardiac Arrest** guideline

Hypothermia can happen even in warmer regions – especially if person is elderly, septic, homeless, immersed, or altered.

[1] Pulse oximetry may be inaccurate if patient is cyanotic. Give oxygen if patient has any respiratory distress.

[2] Hypothermia may produce severe bradycardia – **take at least 45 seconds to palpate a pulse**. Do not treat physiologic bradycardia unless there is also profound hypotension unresponsive to fluids.

[3] Hot packs can be activated and placed in the axillary and groin areas. Care should be taken not to place the packs directly against the patient's skin. Warm the patient compartment of ambulance during transport

Hypothermia Induced Cardiac Arrest

<u>This guideline should only be used when hypothermia is believed to be the primary cause of the patient's arrest</u>

Secondary causes of hypothermia (e.g. sepsis, toxins, hypoglycemia) and cardiac arrest should be managed according to the corresponding cardiac guideline, including recognition of reversible Hs and Ts.

Routine Medical Care/Trauma Care[1]

Confirm pulselessness by performing <u>ALL</u> pulse checks for up to 60 seconds

Attach monitor and defibrillator pads
Confirm cardiac rhythm prior to initiating CPR[2]

VF/VT

- Initiate CPR
- Defibrillate **ONCE** @ max Joules
- **Epinephrine 0.1mg/ml** (1:10,000) 1mg IV/IO **ONCE**
- Measure body temperature[3]

Asystole

- Initiate CPR
- **Epinephrine 0.1mg/ml** (1:10,000) 1mg IV/IO **ONCE**
- Measure body temperature[3]

PEA

- Do **NOT** initiate CPR
- Monitor rhythm – true PEA will rapidly deteriorate to asystole
- Treat Hs and Ts
- Measure body temperature[3]

- Do not give any additional shocks or epinephrine until temp > 86°F
- Remove wet clothing if not already done
- Initiate passive an active rewarming[4]
- Avoid jostling or excessive stimulation during transport – this may precipitate further dysrhythmias

<u>Rewarming Should Include:</u>

- Warmed IVF
- Hot packs (wrapped in towel) applied to torso
- Dry sheets or warming blankets over patient
- Warmed ambulance

- Treat as per standard **Cardiac Arrest** guideline once temperature above> 86°F
- Contact **Medical Control** early for consultation
- Transport patient to hospital regardless of resuscitation efforts unless <u>core</u> temperature > >86°F (30°C) is confirmed

<u>Hypothermia can happen even in warmer regions – especially if person is elderly, septic, homeless, immersed, or altered.</u>

[1] The most experienced provider should intubate to limit manipulation. Avoid hyperventilation which can cause ventricular fibrillation in hypothermic patients. Use $etCO_2$ monitor to maintain normal pCO_2 levels (35-45 mmHg).

[2] Consider withholding CPR if patient has an organized rhythm or other signs of life. Do not perform cardiac pacing or give Atropine if body temperature is < 86°F (30°C). Hypothermic patients have decreased metabolic needs and can better tolerate decreased blood flow states like PEA or severe bradycardia. **Consult with Medical Control**.

[3] If the temperature is unable to be measured, assume severe hypothermia (< 86° F) is present, begin rewarming, and plan for transport.

Emergency Childbirth

Routine Medical Care

Active contractions 2-3 minutes apart?
If so, evaluate for bleeding, discharge and/or body presentation

Delivery Imminent?[1]

Yes

Crowning?

Yes

- Deliver Infant(s)
- If infant is stuck, proceed to *Obstetric Complications* guideline
- Delay cord clamping for 1-3 min after delivery in vigorous term infants[2]
- Keep newborn warm
- Transport to **requested obstretic facility**.

No

<u>If breech, shoulder dystocia, hemorrhage and/or prolapsed cord:</u>

- Refer to **Obstetric Complications** guideline
- Transport immediately to the **closest ED with obstetric services**

No

- Place patient in left lateral recumbent position
- Transport to **requested obstetric facility**
- Reassess likelihood of delivery while en route

<u>If patient is bleeding/hemorrhaging:</u>

- Refer to **Obstetric Complications** guideline
- Transport immediately to **closest ED with obstetric services**

<u>Postpartum Care of Mother</u>

- Allow placenta to deliver spontaneously; do not pull on umbilical cord[3]
- Place tissue in plastic bag and transport
- To promote uterine contraction & control bleeding: massage uterus and allow stable infant(s) to nurse
- If perineum is torn, apply direct pressure with sanitary pads
- Assess maternal blood loss, give IV/IO **Crystalloid fluid bolus** 500ml prn[4] (max 2L) if concern for hypovolemia or signs of poor perfusion

<u>Postpartum Care of Infant</u>

- Monitor/Treat as per **Neonatal Resuscitation** guideline
- Only suction nose/mouth if airway is obstructed or newborn is having difficulty clearing secretions
- Obtain/document APGAR score @ 1 and 5 min
- After 1-3 min, double clamp cord 6" from infant abdominal wall and cut between clamps with a sterile scalpel.
- Transport infant secured in seat or isolette

[1] Signs of imminent delivery: crowning, bulging perineum, urge to push, urge to move bowels. <u>Obtain IV access for any imminent delivery or if patient says she is "high risk."</u>

[2] If resuscitation is needed, clamp cord and cut ASAP.

[3] Do not delay transport awaiting placenta delivery. All products of conception must accompany mother to the ED.

[4] Lactated Ringers is crystalloid fluid of choice if available.

If possible, transport between deliveries when multiple births are expected.

<u>Delivery Procedure</u>

1) **Position mother supine on a flat surface, if possible**
2) **Protect perineum with gentle hand pressure**
3) **Support and control delivery of head as it emerges**
4) **As shoulders emerge gently guide head/neck downward to deliver anterior shoulder**
5) **Support and gently lift head/neck to deliver posterior shoulder**
6) **Rest of infant should deliver with passive participation**

Do not attempt to impair or delay delivery

Obstetric Complications

Routine Medical Care

- Give **high flow oxygen** (15 lpm) via NRB
- Obtain IV access & assess for shock – give IV/IO **Crystalloid fluid bolus** 500ml prn (max 2L) if signs of poor perfusion

Prolapsed Umbilical Cord

- Place mother in knee/chest position or in deep Trendelenburg, if possible
- Place gloved hand into vagina and lift presenting part to allow/increase fetal blood flow – you should feel pulsations
- Keep presenting part elevated until relieved by hospital staff
- Transport immediately to **closest ED with obstetric services**

Bleeding/Hemorrhaging[1]

- Place mother supine and keep warm
- Position mother on left side or manually displace uterus to the left
- Continue to treat shock as outlined above; reassess vital signs often
- Refer to **Medical Hypovolemia** guideline
- Transport immediately to **closest ED with obstetric services unless bleeding is due to trauma**. If due to trauma, transport mother to a trauma center.

Shoulder Dystocia

- Identify "turtle sign" as an indication of this complication[2]
- Support – don't pull – baby's head
- Hyperflex mother's hip to severe supine knee-chest position
- Apply gently, open handed, suprapubic pressure directly over the infant's anterior shoulder
- Transport immediately to **closest ED with obstetric services**

Preeclampsia/Eclampsia[3]

- Treat HTN only for prolonged transport – call **Medical Control** for consultation
- Treat eclampsia immediately with **Magnesium Sulfate ($MgSO_4$)** 4mg IV/IO over 10 min
- Give benzodiazepine as outlined in **Seizure** guideline if patient is still seizing after 5 min on $MgSO_4$ drip
- Monitor for magnesium toxicity (hypotension, somnolence)
- Restrict IV fluids to max 80 ml/hr – assess for pulmonary edema
- Transport immediately to **closest ED with obstetric services**

Breech Birth

- Allow buttocks & trunk to deliver spontaneously; do not attempt to pull an arm or leg through the vagina
- Support the body while the head delivers; let legs dangle if necessary
- If head fails to deliver within 30 seconds, place gloved hand into vagina and hold two fingers between infant's face and uterine wall to create an open airway
- Apply gentle abdominal pressure to uterine fundus
- Transport immediately to **closest ED with obstetric services**

[1] *Abruptio placentae* occurs when there is premature separtion of the placenta from the uterine wall - bleeding is usually painful. Bleeding may be minimal to none if blood is trapped behind the placenta and unable to exit the uterus. *Placenta previa* occurs when the placenta is completely or partially blocking the cervical os – bleeding is usually painless. Mothers with prenatal care are usually aware of this diagnosis – obtain a thorough history.

[2] Turtle Sign - infant's head will retract back into the vaginal canal after it has been delivered, like a turtle sticking its head out of its shell.

[3] Signs of Preeclampsia: Hypertension (SBP > 160 or DBP > 110), headache, confusion, visual changes, pulmonary edema, upper abdominal (RUQ or epigastric) pain. Eclampsia = preeclampsia + seizures. Either may occur from 20 weeks gestation up to six weeks post-partum.

Medical Hypovolemia

Shock is defined as impaired tissue perfusion and may be manifested by any of the following:

- Altered mental status
- Tachycardia
- Poor skin perfusion
- Low blood pressure

Maintain a high index of suspicion. Traditional signs of shock may be absent early in the process.

Routine Medical Care

Is patient hypotensive for age or showing other signs of shock? Give **Crystalloid Fluid** bolus of NS/ LR (500 ml for adults)

Consider causes of shock::

- GI Bleed
- Vaginal Bleed
- Vomiting
- Diarrhea
- Infection
- Cardiac Causes
- CNS Causes
- Non Traumatic Hypovolemia

Hypotension for Age	
Age	Systolic Blood Pressure
> 10 years	< 90 mmHg
1-10 years	< 70 + (2 x age in years)
< 1 year	< 70 mmgHg

Tachycardia for Age	
Age	Heart Rate
> 12 years	> 100 bpm
5-12 years	> 120 bpm
2-5 years	> 140 bpm
1-2 years	> 150 bpm
< 1 year	> 160 bpm

Minimal SBP with Head Injury	
Age	SBP
>10 years	= 110 mmHg
1-10 years	> 70 + (2 x age in years)
1-12 months	>70 mmgHg
< 1 month	> 60 mmHg

Blood Therapy Guidelines

- Suspected or Active GI or Vaginal Bleed
- Signs of Active Bleeding
- Tachycardia
- Hypotension
- Altered Mental Status

If patient is still in shock:

Does patient meet criteria for transfusion of Blood Products?

Yes

Transfuse Blood Product:

Low Titer O+ Whole Blood (LTOWB)
500 ml (2 units) IV/IO
- or -
Packed Red Blood Cells (pRBCs)
500 ml (2 units) IV/IO
- or -
Fresh Frozen Plasma (FFP)
500 ml (2 units) IV/IO

- **Calcium Chloride** 2g IV/IO
- **Tranexamic Acid (TXA)** 2g IV/IO over 10 min, if available (may give IM as a last resort)

No

Fluid Resuscitation:

- Give **Crystalloid Fluid** bolus of NS/LR (500 ml for adults, 20ml/kg for peds)
- If patient is still in shock, continue small Crystalloid Fluid boluses of 250 ml (20ml/kg for peds) until the return of peripheral (radial) pulses
- Once pulses are maintained, lock IV and repeat boluses only as needed for SBP <90 mmHg

Blood Transfusion should occur while in route to the hospital and should not delay transport

Contact Medical Control for consultation or additional orders

Blood Inclusion Criteria

1. Blood Product is available
2. **SHOCK** Is due to **HEMORRHAGE**
3. **5** years of age or older -- **ages 5 - 10 = 1 unit / ages 10 above = 2 units**
4. Pt has **no religious objections** to blood products [obtain verbal consent if patient is capable]
5. Pt has **ONE** of the following criteria:

SBP < 70 mmHg
SBP < 90 mmHg with HR ≥ 110 bpm
Age ≥ 65 yo with SBP < 100 mmHg and HR ≥ 110 bpm

*If criteria is not met and the Blood Medic feels blood is indicated, contact on-call Medical Control / Medical Director prior to initiating.

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Region One Protocol Effort

Cardiac Guidelines

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Cardiac Preambles

I. CARDIAC ARREST

Operational Considerations

Scene Time: All medical patients in cardiac arrest should be treated on scene and where they are found, time worked is dependent on Initial Rhythm unless deemed otherwise per situation / guideline.

- Ventricular Fibrillation / Pulseless Ventricular Tach - work for no less than 30 minutes

- Asystole / PEA - ALS Provider May STOP CPR after 20 minutes if in ASYSTOLE on initial rhythm and ETCO2 is < 20 if CODE is unwitnessed and has remained ASYSTOLE throughout

The most important therapy is effective and minimally interrupted chest compressions. Chest compressions are less effective when moving toward an ambulance or while in a moving vehicle.

Scene Safety: Law enforcement should immediately be requested when patient care cannot be delivered effectively on-scene. Patients should only be moved if the conditions remain unsafe or do not operationally allow for resuscitation. If the patient is unable to be removed without compromising the safety of the crew, additional resources should be called immediately. In this case the patient may be left until additional resources arrive and scene safety is secured.

Sprint Unit Support: When supervisor units or any other single paramedic response vehicle arrives on the scene of a cardiac arrest, their single responsibility is BLS CPR. This course of treatment shall continue until knowledgeable bystanders are able and willing to help or additional paramedics/EMTs arrive.

Minimally Interrupted CPR

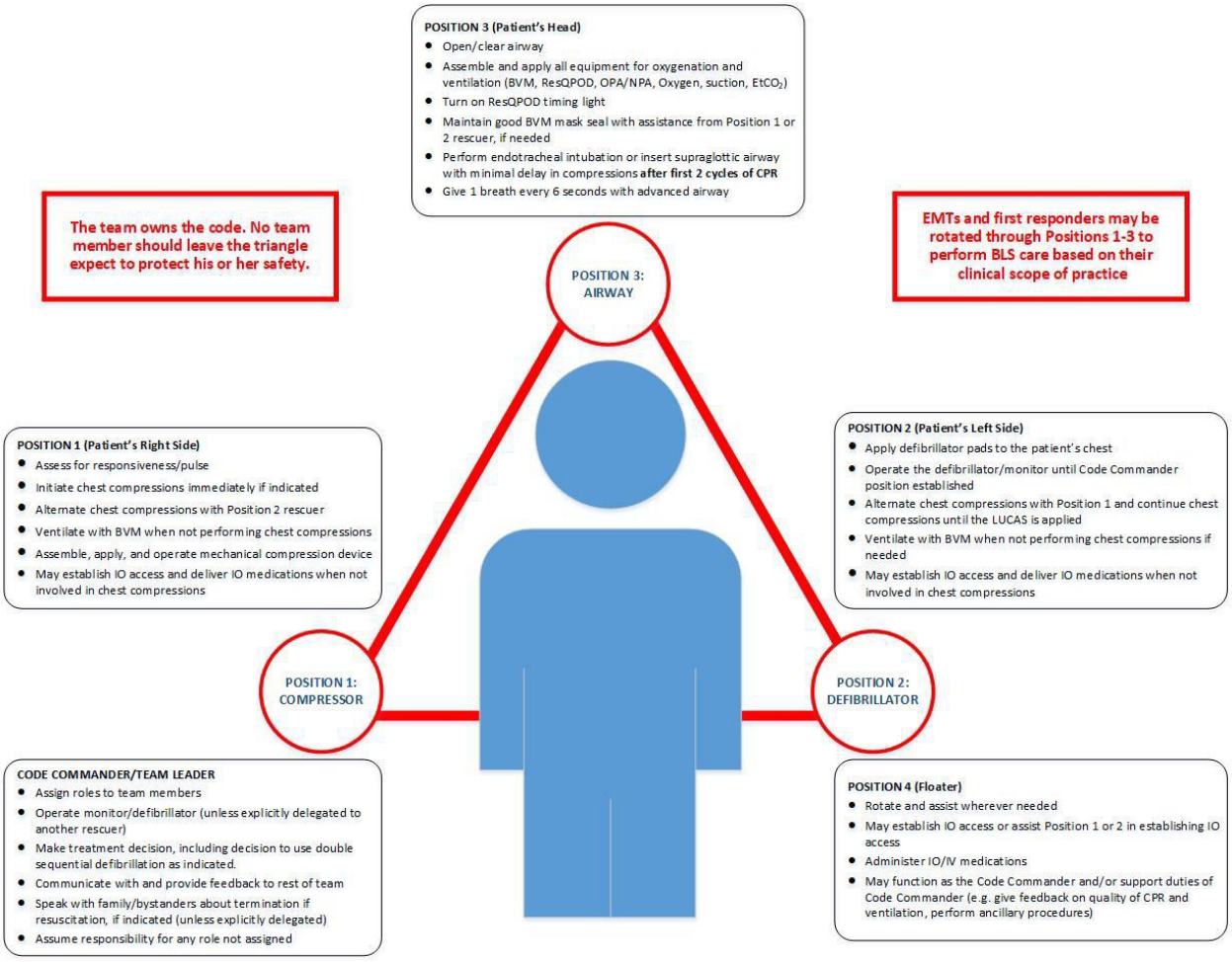
Manual compressions should be started immediately during cardiac arrest as there is virtually no set-up time. (Even basic airway equipment requires some set-up time for sizing and deployment.) The goal for compressions is 100-120 compressions per minute. Push hard and fast allowing for complete chest recoil (2 inches for the average adult). Higher chest compression fraction rates are associated with better rates of survival to hospital discharge. Agencies should aim to achieve a chest compression fraction rate (the percentage of total resuscitation time that compressions are performed) of 80%.

Quantitative end-tidal CO_2 should be used to monitor effectiveness of chest compressions and should be established as soon as possible- ideally as soon as BVM ventilations are initiated. If $ETCO_2$ is less than 10 mmHg during the initial phases of resuscitation, attempt to improve chest compression quality.

Mechanical chest compression devices are a reasonable alternative to conventional CPR. Application time for mechanical devices should be kept to a minimum and training should reflect this. The goal is to maximize compression fraction ratio.

Pit Crew Resuscitation

The pit crew model is a coordinated, patient centered approach to cardiac arrest that increases the likelihood of successful resuscitation. As the name implies, this approach is inspired by the preplanned, well-choreographed pit crews utilized in race car driving to get vehicles back on the track in a hurry. Each



member of the pit has a clearly defined task for which they are well trained and able to perform efficiently. The team depends on each person's successful and timely completion of their assigned task in order to achieve the best outcome.

A minimum of three healthcare providers are needed by the patient's side to perform pit crew CPR as it is intended; however high-performance teams of up to six members have been identified. Roles are as follows:

Defibrillation

Defibrillation is most successful when administered as soon as possible after onset of VF/VT. When VF/VT has been present for more than a few minutes, myocardial reserves of oxygen and other energy substrates are rapidly depleted. A period of CPR prior to defibrillation helps to replenish these substrates and improves the odds of defibrillation success. This initial period of CPR may range from 30 seconds to 3 minutes prior to obtaining an initial rhythm analysis.

Applying defibrillation pads, powering on the defibrillator/monitor, analyzing cardiac rhythm, and

charging the capacitor can all be accomplished during the initial CPR period, and defibrillation can occur as soon as the device is ready for use. If the patient is being monitored with pads in place at the time of a witnessed arrest, defibrillation should occur immediately.

The maximum setting on the defibrillator should be used for initial and subsequent defibrillation attempts. Defibrillation dosing should follow manufacturer's recommendation in the case of biphasic defibrillators. If the manufacturer's recommendation is unknown, use the highest setting possible. In the case of monophasic devices, the setting should be 360 Joules.

Minimizing disruptions in CPR surrounding shock administration should be a high priority. CPR should continue while the defibrillator is charging and should resume immediately after shock to increase the chest compression fraction rate. Pre-charging the defibrillator before a rhythm check and hovering over the chest during shock (rather than stepping away during defibrillations) help to decrease the length of peri-shock pauses. If a mechanical CPR device is used, CPR can continue during defibrillation.

Chest compressions should be continued for two minutes after defibrillation with no pauses or pulse checks regardless of the rhythm displayed on the cardiac monitor. Serial "stacked" shocks (shocks delivered with no compressions in between) are not recommended. There is declining success with serial shocks when the first shock has failed, and the protracted interruption in CPR after a series of shocks has to date been shown to negatively affect patient survival to hospital discharge.

Airway Management During Resuscitation

Airway management is of secondary importance and should not interfere with compressions and defibrillation. Therefore, the first cycle of chest compressions should be initiated without delay while allowing time for basic airway equipment set-up/sizing.

The proper strategy of airway management is currently not defined. Recommended options for airway management within Region One include:

- BVM ventilation at 10 breaths per minute (1 breath every 10 compressions), applied during the upstroke between compressions, without interrupting the compressions.
- Advanced airway placement may take place after vascular access has been established.
    1. Either a supraglottic airway or an endotracheal tube may be placed without interruption of compressions
    2. Ventilations are provided at 10 breaths/minute for adults with continuous compressions (i.e. no pauses to ventilate)

Oropharyngeal and nasopharyngeal airways should be used to maintain a patent airway and facilitate appropriate ventilation prior to advanced airway placement. ETCO2 should be utilized with airway management to provide feedback on quality of management and advanced airway placement/efficacy.

Hyperventilation during resuscitation is potentially harmful and should be avoided. Excessive ventilation rates result in increased intrathoracic pressures, reduced venous return to the heart, reduced cardiac output, and reduced coronary artery perfusion. Hyperventilation also causes increased CO_2 exhalation, reduced CO_2 in the arterial blood, contraction of cerebral blood vessels, and decreased cerebral blood flow, all resulting in the occurrence of cerebral ischemia. Proper ventilation with controlled peak

inspiratory pressure will reduce the likelihood of barotrauma, keep GI distension to a minimum, and reduce the risk of aspiration.

Medication Administration During Resuscitation

Intravascular (IV) or intraosseous (IO) access should be obtained for emergency drug and fluid administration during resuscitation. IO access is the preferred route for initial access during arrest unless IV access was established prior to arrest.

All medications should be followed by a 20ml bolus of NS/LR.

NOTE: Delivery of drugs via an endotracheal tube is the least-preferred route of administration and is associated with unpredictable, and generally lower, drug concentrations. This route should only be utilized with Medical Control orders.

Though recent studies suggest more severe neurologic impairments amongst survivors of cardiac arrest given epinephrine, 2020 American Heart Association guidelines continue to support administration of 1mg of epinephrine every 3 to 5 minutes. Operationally, administering epinephrine every second cycle of CPR, after the initial dose, is reasonable with a maximum dosage of 3mg.

Amiodarone may be used as an antiarrhythmic as indicated by protocol for VF/pulseless VT unresponsive to CPR, defibrillation, and vasopressor therapy. Lidocaine may be considered as an alternative to amiodarone. No antiarrhythmic drug has been shown to increase survival or neurologic outcome after cardiac arrest due to VF/pulseless VT.

The routine use of calcium, magnesium, and sodium bicarbonate is not recommended during resuscitations and should be reserved to treat specific reversible causes of arrest.

Post-ROSC (Return of Spontaneous Circulation)

It is advisable for providers to remain on scene and maximize hemodynamics once return of spontaneous circulation (ROSC) occurs. Stepwise intervention should focus on treating hypotension, hypoxia, hypo-and hypercapnia, and fever. The goal is to optimize functional neurologic outcome following arrest.

Most patients immediately post-resuscitation will require ventilatory assistance. Hyperventilation is a significant cause of hypotension and re-arrest in the post-resuscitation phase and must be avoided. Other common causes of post-resuscitation hypotension include hyperventilation, hypovolemia, and pneumothorax.

The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require close monitoring. A significant percentage of post ROSC patients will re-arrest. Post-ROSC patients also may have evidence of ST elevation MI on EKG. Providers should obtain a 12-lead EKG as soon as feasible after ROSC. ROSC is a delicate state for patients, especially for their hearts that will present with rapidly changing EKG rhythms as it begins to re-profuse. Before treating for common post- ROSC rhythms (like A-Fib with RVR) confirm that it is a sustained rhythm. This does not include V-Fib/V-Tach. EKG should be closely monitored throughout post-ROSC care.

Ongoing trials exist to measure the efficacy of initiating targeted temperature management (TTM). Although early initiation of TTM appears to reduce neurologic disability, its implementation – including timing, equipment, and temperature goals - has been challenging in the prehospital environment. This therapy remains a major topic of clinical investigation. Active cooling to the best of the crew's ability is at the discretion of the provider, except for Exsanguination and Hypothermic codes which should be actively warmed.

Decisions to Withhold or Terminate Resuscitation

- Even if all criteria for death and DNAR (Do Not Attempt Resuscitation) are met, providers may decide to initiate CPR for scene safety and/or family wishes.

- When it is anticipated that resuscitation will be terminated in the field, attention should be focused on the family and/or bystanders. Explain the rationale for termination of resuscitation, answer any questions they may have, and try to inform them of next steps to the best of your availability.

- If there is a personal physician on scene who has an ongoing relationship with the patient, that physician may decide if resuscitation is to be initiated. If the physician decides resuscitation is to be initiated, ROPE guidelines should be followed unless the physician agrees to assume full authority over patient care until face-to-face handoff to another physician as outlined in the Physician On-Scene policy in the ROPE Introduction. This means if the physician agrees to assume full authority, they will need to ride with the crew to the hospital if the patient is transported.

- If a registered nurse from a home healthcare or hospice agency is present at the scene who has an ongoing relationship with the patient and who is operating under orders from the patient's private physician, the authorized nurse may decide if resuscitation is to be initiated.

- If the physician or authorized nurse decides resuscitation is to be initiated, ROPE guidelines and usual direct medical oversight procedures should be followed.

- Any physician may give orders to withhold or terminate resuscitation. However, as promulgated by RS 9:111A, a physician's pronouncement of death must be preceded by the physician's personal evaluation and examination of the individual and cannot be delegated to another licensed health care provider. The exception to this rule is the coroner's office, As per RS 9:111 A, the medical pronouncement of death by a coroner may be based on personal observation, information, or statements obtained from coroner investigators or emergency medical technicians at the scene who are reporting from firsthand observation of the physical condition of the deceased.

II. SPECIAL CIRCUMSTANCES IN CARDIAC ARREST

Pregnancy

A significant portion of cases of maternal cardiac arrest are attributed to reversible etiologies. This unique population may be more salvageable than most patients receiving CPR. In the case of cardiac arrest of a pregnant patient with gestational age (GA) > 20 weeks, an attempt at resuscitation should be made for the sake of the mother and the fetus. The best hope for fetal survival is maternal survival. Standard ACLS

algorithms, including hand placement for compressions and use of defibrillation, should be applied for the pregnant patient. However, consider the following physiologic changes during patient care:

Airway – A difficult airway is common in pregnancy because of vascular engorgement of the upper pharynx and larynx leading to narrowing of the airway passage. The most experienced provider on scene should insert an advanced airway (ETT or SGA) as early as possible. The size of the ETT is commonly decreased by 0.5 – 1.0 mm compared to a non- pregnant female. Early intubation also decreases the risk of aspiration caused by a more relaxed gastroesophageal sphincter.

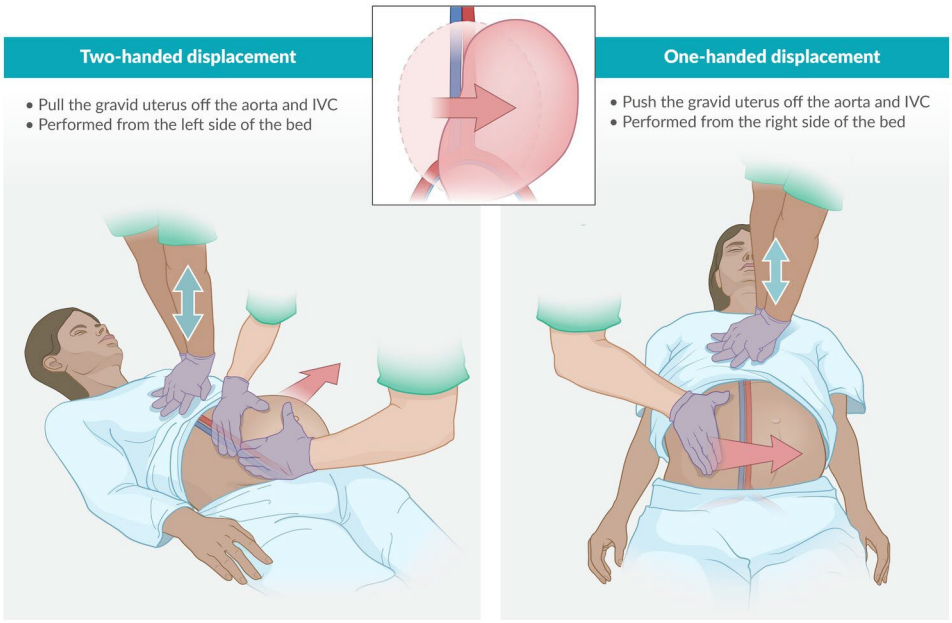
Breathing – Pregnant women are less tolerant of oxygen deprivation and more susceptible to hypoxemia. The patient's elevated diaphragm decreases their functional lung capacity during their body and fetus' increased demand for oxygen. This reinforces the benefit of early insertion of an advanced airway. Techniques used to confirm ETT placement do not change. Though chest wall compliance decreases with pregnancy, lung compliance does not change. Avoid hyperventilation and maintain similar ventilation volumes to non-pregnant patients.

Circulation – Compression of the inferior vena cava starts at approximately 20 weeks gestation in single pregnancies, thereby reducing stroke volume and cardiac output. *The GA is presumed to be over 20 weeks when the height of the uterine fundus is at or above the umbilicus. **Perform manual left lateral uterine displacement to relieve aortocaval pressure during high quality CPR.** Obtain IV/IO access above the diaphragm to prevent trapping of fluid/medication below the gravid uterus. Hemorrhage is a common cause of maternal cardiac arrest. Consider this etiology early and treat it with crystalloid fluid and/or blood products, if available.

Although the heart is shifted to the left during pregnancy, it is not significantly elevated (as demonstrated by cardiac MRI) – **hand position during CPR should not be modified in the pregnant patient.** Rhythm analysis and defibrillation are performed in a similar manner to the nonpregnant patient with utilization of the same levels of energy. Medication dosages utilized also are not altered in maternal cardiac arrest.

When caring for a pregnant patient with a gestational age estimated to be >20 weeks do not resuscitate on scene for 30 min. Perimortem cesarean delivery (PMCD) at or greater than 20 weeks appears to improve outcomes of maternal cardiac arrest when resuscitation does not rapidly result in ROSC. Shorter time intervals from arrest to delivery appear to lead to improved maternal and neonatal outcomes. Transport promptly to the closest facility capable of performing a PMCD (preferably one with OB/GYN services but not required) for evaluation of a perimortem cesarean section. Capable receiving facilities should be contacted as soon cardiac arrest >20 weeks is recognized to allow for smooth delivery of care and confirm they are capable of handling this patient.

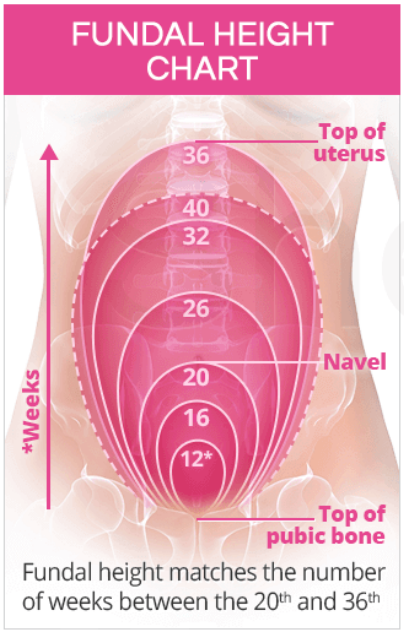
In situations where the medic can verify a prolonged down time or injuries incompatible with life, the medic should follow the standard DNAR guideline.



Walk your fingers up the side of the belly.

Find the top of the uterus (it feels like a hard ball under the skin).

You can feel the top by curving your fingers into the belly.



Hypothermia-Induced Cardiac Arrest[1]

Hypothermia can occur even in warmer climates. Persons most at risk of hyperthermia are the young and elderly, persons exposed to the outdoors for extended periods (ex. homeless, hikers), persons with altered mental status (ex. intoxication), and those with persistent medical condition such as sepsis, hypoglycemia, neuromuscular disease, malnutrition, hypothyroidism, and adrenal insufficiency.

Signs of life may be difficult to detect in the prehospital setting. The heart rate can be very slow, and pulses are difficult to palpate. Take up to one minute when feeling for a pulse and confirm cardiac movement with ultrasound if available. The hypothermic heart is very sensitive to movement. Rough handling of the patient may precipitate arrhythmias, including ventricular fibrillation. Take care to avoid jostling the patient during the physical examination or the performance of essential procedures. Breathing can be very slow and shallow but detectible in the absence of palpable pulses. Cardiac monitoring should be used to assess the patient's rhythm when providers are unsure if a pulse is present. Resuscitation should not be attempted if the patient's chest wall is too stiff for compressions, obvious fatal injuries are present (ex. decapitation), or the patient has been submerged for more than an hour. **Fixed/dilated pupils, apparent rigor mortis, and dependent lividity are not considered contraindication to resuscitation of a severely hypothermic patient.**

It also may be difficult to determine core body temperature in the prehospital setting. Many thermometers today will measure temperatures below 86°F (30°C); however, providers who are unable to obtain a thermometer reading should assume the patient is *severely hypothermic* with a core body temp of less than 86°F (30°C).

Due to the neuroprotective effects of hypothermia, patients have survived long periods of CPR after hypothermic cardiac arrest. Resuscitation should focus on effective chest compressions and attempts at rewarming. Providers should initiate field-rewarming methods such as placement of large heat packs or heat blankets to the anterior chest or wrapped around the patient's chest. Heat sources should never be applied directly to the skin; providers should place a barrier between the skin and the heat source to prevent burns.

Ventricular dysrhythmias are often refractory to electricity when the patient is still hypothermic. It is reasonable to deliver one shock and one round of medication but delay further attempts until the patient is rewarmed. It is often useful to be in contact with Medical Control during these cases.

Lightning Strikes/Electrical Injury

Cardiopulmonary arrest after lightning strike or electrical injury may have good outcomes with prompt intervention. Patients may have dilated pupils due to autonomic dysfunction. An attempt at resuscitation should be made unless an extended downtime can be verified and/or injuries incompatible with life are present.

[1] Zafren et al. 2014. *Wilderness Environ Med; 25*:S66-S85.

Once the scene is declared safe and smoldering clothing has been removed, early aggressive CPR, defibrillation, and airway control should be the focus of treatment.
Because of the increased risk of tracheal edema, endotracheal intubation should be considered early even if spontaneous breathing has resumed. Defibrillation should be performed without delay. If there is any doubt in distinguishing asystole vs. "fine V-Fib" the paramedic should consider defibrillation.
When encountering a mass casualty incident where triage is necessary, victims of lightning strike who are in respiratory or cardiac arrest should be given highest priority (in contrast to their "black" distinction during MCIs of other causes).

III. EKG ANATOMY & INTERPRETATION

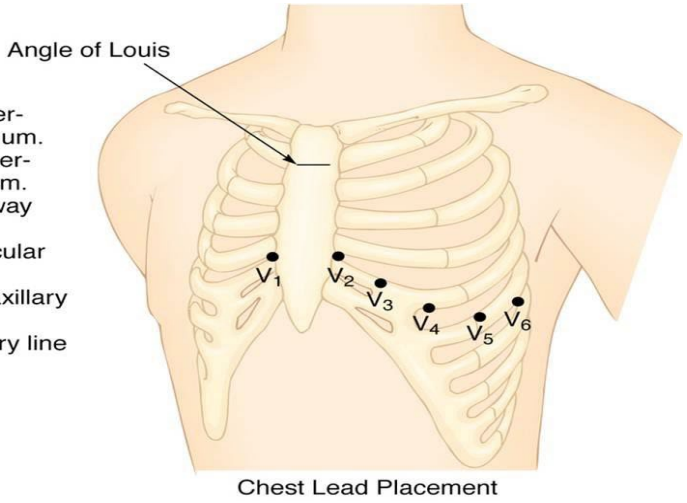
Certain guidelines require 12-lead EKG testing. Other patient complaints and/or assessment findings may warrant 12-lead EKG testing as a diagnostic tool. Acute coronary syndrome (ACS) may not present as chest pain. Atypical or unusual symptoms are more common in women, the elderly, and diabetic patients. Patients with suspected ACS should receive at least two serial EKGs (performed 10 minutes apart) in the prehospital setting to evaluate for dynamic changes during transport.

EKG Indications

- Chest pain or discomfort
- Epigastric pain
- Nontraumatic back, neck, jaw or arm pain
- Palpitations
- Shortness of breath
- Dizziness
- Syncope or near syncope
- Weakness or fatigue
- Diaphoresis unexplained by ambient temperature
- Unexplained nausea or vomiting
- Feel of anxiety or impending doom
- Suspected drug overdose
- Suspected diabetic ketoacidosis
- An unconscious patient
- Any patient with a coronary stent placed <60 days prior
- Any heart rate less than 50 or greater than 110
- Any patient you think may have symptoms that are cardiac in origin

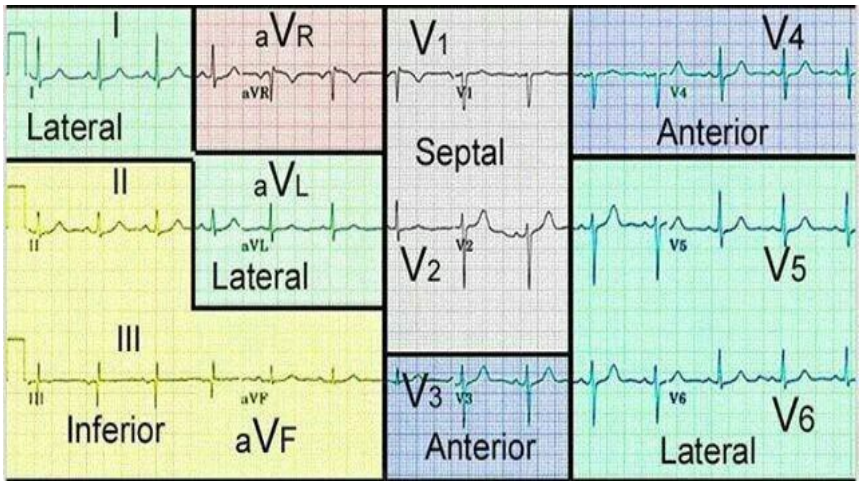
EKG Lead Placement

Lead V_1 The electrode is at the fourth intercostal space just to the right of the sternum.
Lead V_2 The electrode is at the fourth intercostal space just to the left of the sternum.
Lead V_3 The electrode is at the line midway between leads V_2 and V_4.
Lead V_4 The electrode is at the midclavicular line in the fifth interspace.
Lead V_5 The electrode is at the anterior axillary line at the same level as lead V_4.
Lead V_6 The electrode is at the midaxillary line at the same level as lead V_4.



Chest Lead Placement

Bledsoe B, Porter R, Cherry R. Essential of Paramedic Care 2nd ed. 2007. Upper Saddle River



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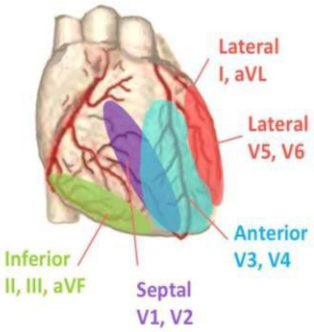


pinterest.com

EKG Leads and Corresponding Vascular Supply

Lateral Leads – I, aVL, V5, V6	**LCx or Diagonal of LAD**
Inferior Leads – II, III, aVF	**RCA and/or LCx**
Anterior/Septal Leads – V1-V4	**LAD**

The most important cause of ST abnormality is myocardial ischemia or myocardial infarction. Currents flowing from ischemic regions of the heart to normal myocardium result in the appearance of ST segment elevation or depression. In general, ST elevation indicates myocardial injury (i.e. muscle death), while ST depression indicates myocardial ischemia (lack of oxygen that will develop into myocardial injury if untreated).

Definition of ST elevation myocardial infraction (STEMI):

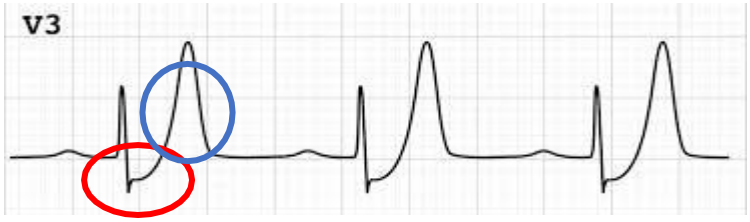
- STE > 1mm in at least two contiguous leads in all leads other than V2-V3
- In leads V2-V3:
    - STE > 1.5 mm in leads V2-V3 in women
    - STE > 2mm in leads V2-V3 in men > 40 years of age
    - STE > 2.5 mm in leads V2-V3 in men < 40 years of age

The presence of reciprocal ST depression helps to confirm the diagnosis of STEMI.

Additional Indicators of Acute Coronary Occlusion

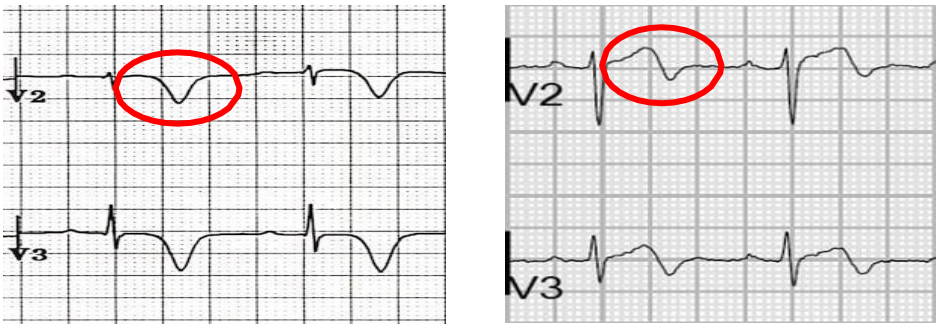
Both of the following EKG patterns are subtle finding that have been seen in patients with high-grade proximal occlusions, most commonly to the LAD. Early identification and cath lab activation are key to decreasing patient mortality.

- DeWinter Syndrome – the de Winter EKG pattern is seen in the precordial leads. V1-V6 may show upsloping ST segment depressions with tall, symmetrical T waves. This pattern is transient and dynamic; it presents in the early stages of an MI.



Life in the Fastlane – litfl.com

- Wellens Warning – Wellens is a pattern of deeply inverted or biphasic T waves in V2-V3. Patients may be pain free by the time an EKG is taken.



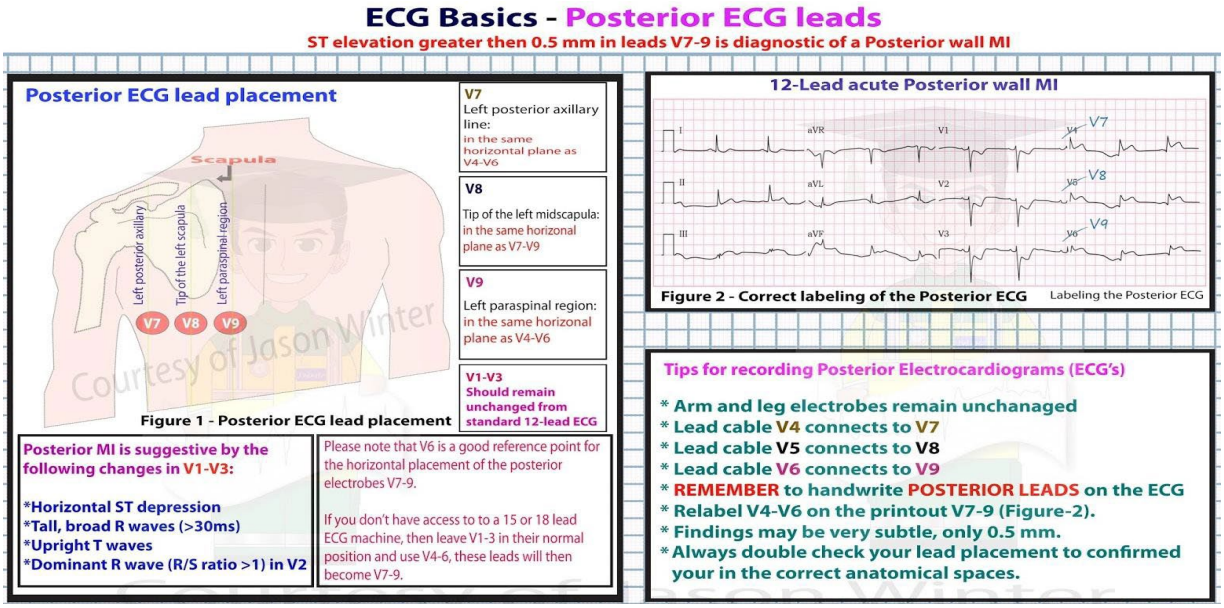
Life in the Fastlane – litfl.com

Posterior Wall Infarction

Posterior wall MIs commonly occur in the context of an inferior and lateral infarction, where the RCA or left circumflex artery are occluded. Occasionally a posterior MI is isolated (3-11% of all MIs) but may be missed when they are isolated. Patients with classic symptoms of ischemia will have more subtle EKG changes that require rapid recognition.

Because the posterior myocardium is not directly visualized by the standard 12-lead EKG, providers must look for reciprocal changes of STEMI in the anteroseptal leads V1-V3:

- ST depression
- Tall R waves
- Upright T waves



Flipping over the EKG is one way that providers can recognize posterior MIs – it will look like a typical STEMI when inverted. Posterior infraction is confirmed by the presence of ST elevation and Q waves in the posterior leads V7-V9. The degree of ST elevation seen in V7-V9 is typically modest but should still be recognized as a STEMI if ≥ 0.5mm of elevation is present. When the strip is printed, providers must remember to write "V7, V8, V9" over lead V4, V5, and V6, respectively.

Right Ventricular Infarction

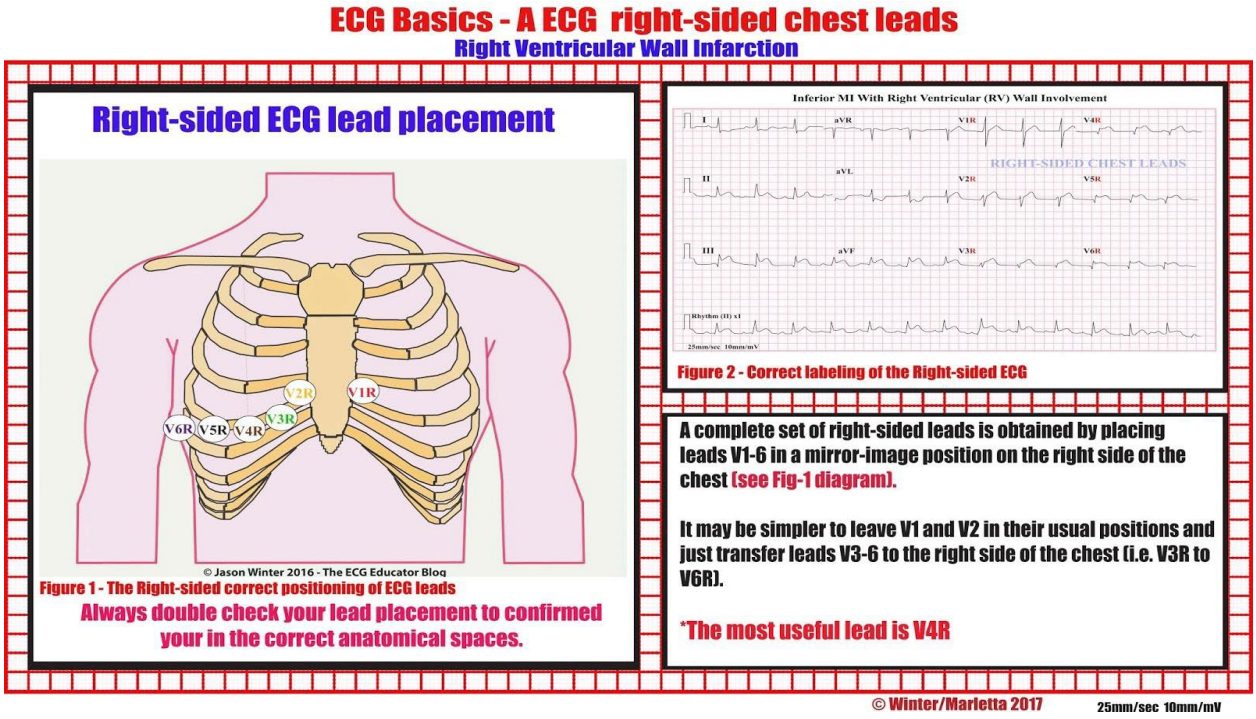
Right ventricular infarcts complicate up to 40% of inferior STEMIs. Isolated RV infarction is extremely rate. The coronary artery involved is usually an occluded right coronary artery (RCA). Patients with RV infarction are very preload sensitive (due to poor RV contractility) and develop severe hypotension in response to nitrate or other preload-reducing agents. Hypotension in RV infarctions is treated with fluid boluses and discontinuation of nitrate use.

In patients presenting with inferior STEMI, right ventricular infarct is suggested by the presence of

(a) ST elevation in V1

(b) ST elevation in lead II > lead II

RV infarction is confirmed by the presence of ST elevation in the right-sided leads (V3R-V6R). The most useful lead is V4R. ST elevation in V4R has a high accuracy for the diagnosis of RV MI. When the strip is printed, providers must remember to write "R" beside the V leads to mark that they are right leads, not left.



IV. ADDITIONAL CARDIAC PEARLS

Acute Coronary Syndrome

Risk factors for a Major Cardiac Event

Consider the following risk factors for patients with symptoms suggestive of ACS. If the patient's history is even moderately suspicious for ACS, having three or more of the following risk factors (or a history of atherosclerotic or chronic kidney disease) significantly increase their risk of an acute cardiac event.

1. Male or post-menopausal female
2. Hypertension
3. High cholesterol
4. Diabetes Mellitus (type I or II)
5. Chronic kidney disease
6. Use of tobacco products (current or cessation ≤ 3 months)
7. Obesity (BMI > 30 kg/m^2)
8. Physical inactivity
9. Family history [2,3] of atherosclerotic disease before the age of 65

[2] Immediate family only: mother, father, brother, sister

[3] Prior myocardial infarction, prior stents, CABG/cardiac bypass surgery, CVA/TIA, peripheral arterial disease)

Remember Nitroglycerin and Aspirin (ASA) do not treat the pain of ACS. They are indicated to provide increased perfusion around a blockage that could be causing the symptom of pain.

In the case of ACS the reported chest pain is assumed to be caused by the hypoxia cell death and inflammation at the site of vascular blockage either from a clot or other blockage such as plaque buildup. The hypoxia is caused by a decrease in perfusion due to the suspected blockage impeding blood flow thus impeding oxygen delivery to those areas. Nitroglycerin's vasodilative properties allow for an increase in the area around the block to provide space for blood to continue flowing around the obstruction. Aspirin has an anti-thrombotic effect that does not break up the suspected clot but does help in preventing the clot from increasing in size and/or the formation of new clots. It does this by inhibiting the enzymes (COX-1, COX-2) that form the lipid (prostaglandin) responsible for platelet aggregation (clots). Because there is no way to know the source of the suspected block, ASA is given for all suspected blockages as it has been shown to be a game changer in survivability with MI caused by clots, with relatively small chance of harming patients whose condition have nothing to do with clot formation.

These medications may decrease pain by addressing the suspected underlying issue but should not be administered purely for pain management. Fentanyl can be considered in an ACS patient for severe persistent pain. Pain causes stress that can put additional pressure on the cardiovascular system (ie hypertension, tachycardia, hyperventilation) exacerbating the suspected cardiac event. Pain management should be utilized if persistent pain is believed to be having this effect on an ACS patient.

Bradycardia & Transcutaneous Pacing[4,5,6]

Bradycardia should be managed in the least invasive manner possible. However, in cases of impending hemodynamic collapse, providers should proceed directly to transcutaneous pacing. Push dose epinephrine (to be discussed later) in addition to or in place of atropine may also be used when symptoms of hemodynamic instability are present. Before initiating TCP consider etiology of Bradycardia. If it is not believed to be an electrical issue (ie 2nd or 3rd degree heart block) consider underlying causes that may be causing the Bradycardia. For instance, if a patient has a history of renal failure and has missed dialysis appointments and is displaying sinus bradycardia, consider calcium and vasopressor (if indicated) administration before TCP.

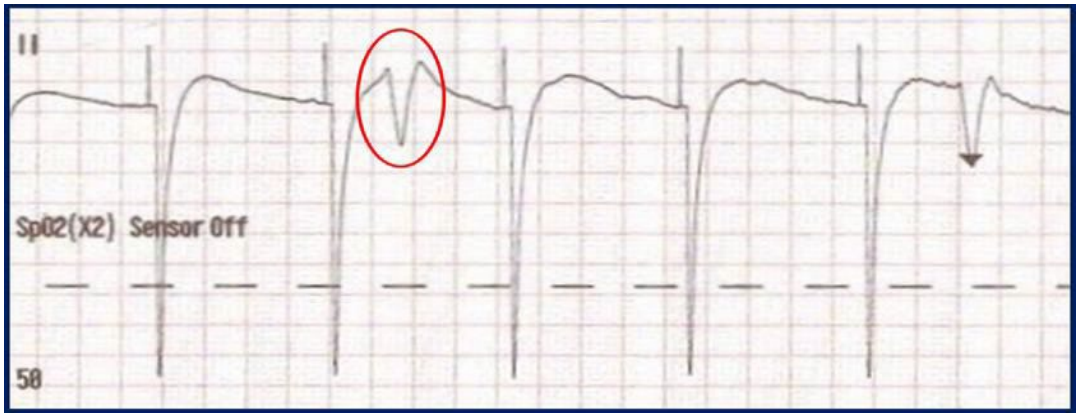
If a Bradycardic patient is hypothermic, handle the patient delicately. Make sure to take a full 60 seconds to confirm a pulse. Confirm lack of cardiac movement with an ultrasound if available before calling a cardiac bradycardic rhythm PEA. Do not treat bradycardia in these patients unless they are hypotensive and/or not responsive to fluids. **Do not provide TCP or Atropine if the patient is less than 86°F. If a temperature is unable to be obtained their temperature must be presumed to be less than 86°F.** The hypothermic heart is very sensitive to movement. Rough handling of the patient may cause arrhythmias, including ventricular fibrillation. Take care to avoid jostling the patient during the physical examination or the performance of essential procedures.

Many clinicians have difficulty performing the infrequent skill of transcutaneous pacing (TCP). Failure to achieve true electrical and mechanical capture is common and frequently due to poor pad placement or insufficient milliamperes and the rhythm contraction of the patient's body from the pacer shocks makes assessment even more difficult.

False capture is due to electrical artifact created by current passing through pacing pads. The EKG electrodes pick up the signal produced by the current and display it as artifact on the EKG screen to signify when the current is being delivered. To minimize the size of the current displayed on the EKG screen, monitors with integrated pacemakers intentionally blank out for a brief period. Occasionally some of the EKG artifact may remain after the blanking period and that portion is seen immediately following the pacer spike. This false capture is frequently confused with true electrical capture.

Unrecognized false capture often results in unrecognized deterioration to cardiac arrest. This can lead to a complete lack of cardiac arrest care or significant delay in cardiac care based on when false capture is realized. Frequent reassessment of the patient's condition must be performed to avoid this failing.

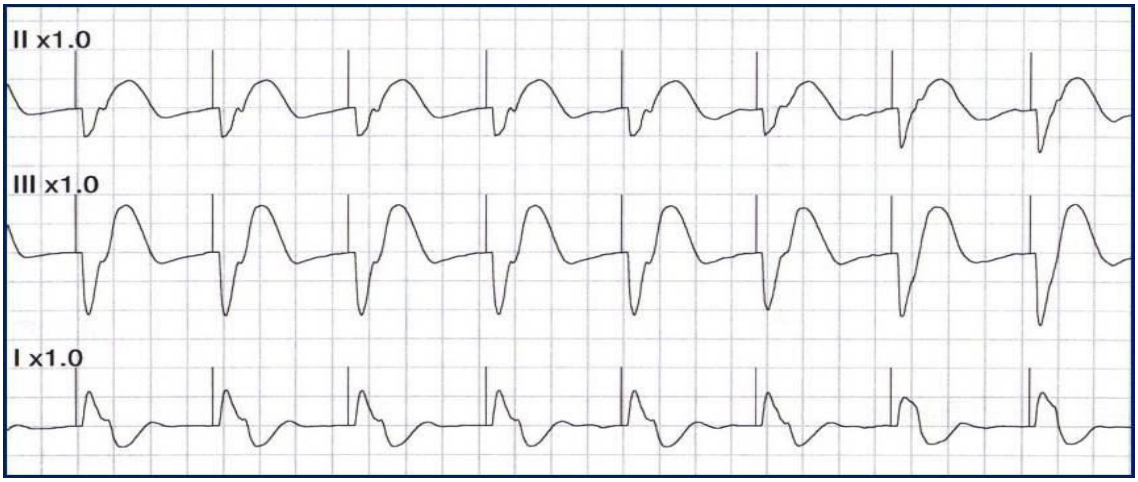
The classic features of false capture (depicted below) include a near-vertical upstroke or down-stroke of the "phantom" QRS complex followed by a slightly curved return to the isoelectric line, a non-distinct ST segment and unimpressive T-waves. The patient's underlying rhythm (circled in red) can often be seen in what should be an absolute refractory period of the preceding QRS complex.



Example of false capture

[4] https://www.aclsmedicaltraining.com/blog/transcutaneous-pacing-tcp-without-capture/
[5] http://ems12lead.com/2008/11/15/transcutaneous-pacing-tcp-the-problem-of-false-capture/
[6] https://www.physio-control.com/uploadedFiles/learning/clinical-topics/Pacing_Artifact_3207454-000.pdf

True electrical capture will show wide QRS complexes with tall, broad T waves as seen below.



It is scientifically impossible to have the patient's underlying rhythm produce a QRS complex during the absolute refractory period produced by a pacer shock. In addition to assessing the patient's response to treatment, providers may take the following measure to distinguish between electrical capture and artifact:

(a) Increase the current of pacing (warn the patient first). False QRS complexes will increase in size as current is increased. True QRS complexes should not change in size regardless of the milliamperes used.

(b) place the pacer in non-demand mode (on some cardiac monitors) in non-demand mode and examine the absolute refractory periods of the underlying rhythm and the (presumed to be) paced rhythm. If the paced rhythm and the underlying rhythm are marching through each other's absolute refractory periods, you don't have true electrical capture.

Increasing the EKG size helps to confirm that the pacer senses intrinsic cardiac activity. Once electrical capture is believed to have occurred, providers should check a patient's femoral pulse when uncertain if a radial pulse is present – muscle tremors may complicate evaluation of the distal extremities. Pacing also may cause diaphragmatic stimulation and apparent hiccoughs in patients – this is expected and may be partly relieved with sedation. If you are still unsure if patient has a pulse pacing can be paused to confirm.

Hypertension

Do not treat hypertension alone. Even with extremes of blood pressure, providers should use the complaint-specific guideline to treat the symptoms associated with hypertension. In cases where hypertension is present in a complaint specific guideline that calls for fluid administration (hyperglycemia, sepsis) fluid administration should still be administered beginning with a fluid challenge of 500 ml, and then frequently reassessed for fluid overload, increase in blood pressure, and/or changes in EKG. Often hypertension is a side effect of the conditions and will improve with treatment on the underlying cause. Treat the patient, not the number.

If the patient's complaint is high blood pressure, a 12-lead EKG should be obtained.

Asymptomatic hypertension should not be treated in the prehospital setting. However, transport to the ED will allow for physician evaluation, possible treatment, and the arranging of follow-up care that the patient may not otherwise receive. For the patient whom a provider suspects are unlikely to comply with the need for follow-up care, every effort should be made to convince the patient to consent to transport to the ED for evaluation. BLS care during transport is appropriate for the patient with elevated blood pressure who has no complaints.

Adult Syncope

Syncope is heralded by both the loss of consciousness and the loss of postural tone and resolves spontaneously without medical interventions. Syncope typically is abrupt in onset and resolves equally quickly. EMS providers may find the patient awake and alert on initial evaluation. Convulsive movements may occur with syncope. These are called myoclonic jerks and should not be confused with seizures; no post-ictal state, tongue biting, or incontinence will be present. Presyncope is defined as the prodromal symptoms of syncope. It usually lasts for seconds to minutes and may be described by the patient as "nearly blacking out" or "nearly fainting."

By being most proximate to the scene and to the patient's presentation, EMS providers are commonly in a unique position to identify the cause of syncope. Consideration of potential causes, ongoing monitoring of vitals and cardiac rhythm as well as detailed exam and history are essential pieces of information to pass onto hospital providers. Orthostatic vitals are highly recommended in these cases. Positive orthostatic vital signs can be indicative of dehydration. Consider the whole clinical picture including possibility of high risk causes before syncope is attributed to more common, non-life-threatening causes such as dehydration, and vagal stimulation from bearing down.

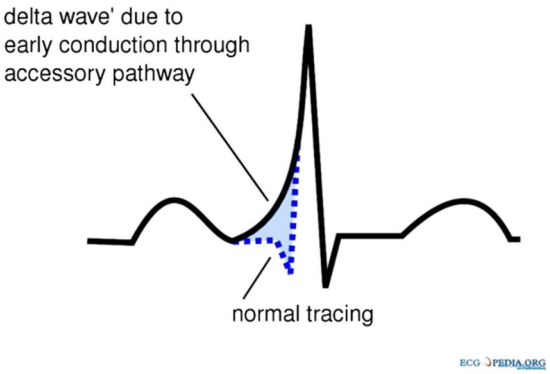
High risk causes of syncope include the following:

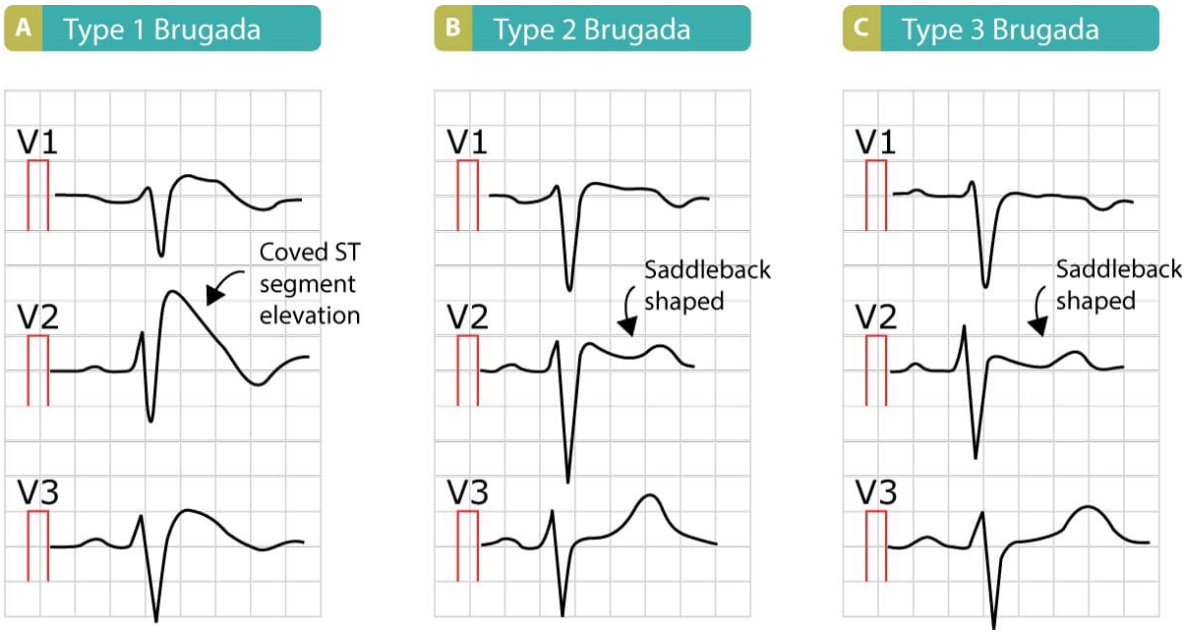
a. Cardiovascular
    i. Myocardial infarction
    ii. Aortic stenosis
    iii. Hypertrophic cardiomyopathy
    iv. Pulmonary embolus
    v. Thoracic aortic dissection
    vi. Lethal dysrhythmia
b. Neurovascular
    i. Intracranial hemorrhage
    ii. Transient ischemic attack or stroke

Treatment of syncope should be directed at abnormalities discovered in the physical exam and may include management of cardiac dysrhythmias, cardiac ischemia/infarct, hemorrhage, shock, and the like. Consider high risk 12-lead EKG features including, but not limited to:

    a. Evidence of QT prolongation (generally over 500ms)
    b. Delta waves (seen with Wolff-Parkinson-White syndrome)
    c. Brugada syndrome (incomplete RBBB pattern in V1/V2 with ST segment elevation)
    d. Hypertrophic obstructive cardiomyopathy

Syncope should be considered in geriatric patients suffering falls from standing. They also may sustain significant injury and should be diligently screened for trauma.

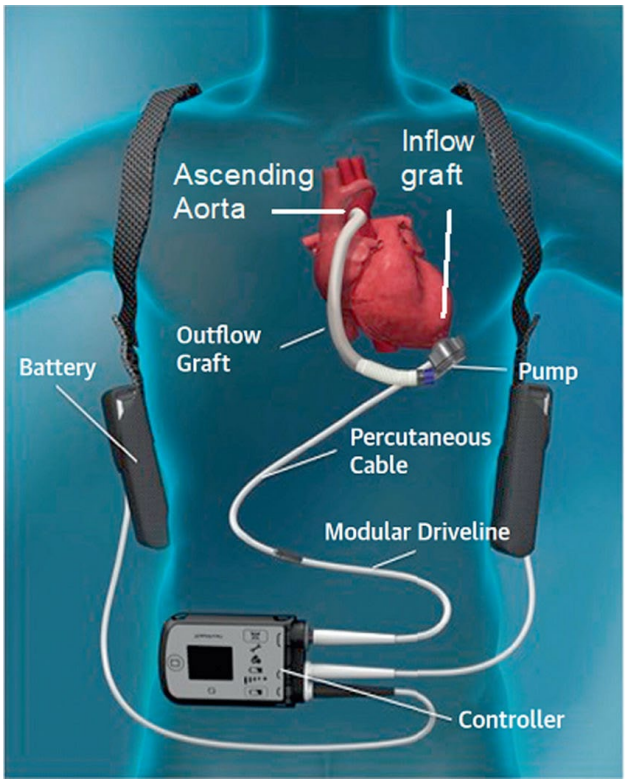




V. IMPLANTABLE VENTRICULAR ASSIST DEVICES[78]

Left Ventricular Assist Device (LVAD)

The LVAD is a mechanical internal heart pump used to treat heart failure. The pump provides continuous blood flow from a weak left ventricle, propelling it to the aorta through a pump lace between the two. The pump and circulation connections are all in the body. The pump has a driveline which connects the outside battery packs to the pump. Each LVAD has a controller which displays pump parameters, warnings, and gives diagnostic information if an error has occurred. All controllers are branded with the model name of the system; this can be located by opening the pouch or pocket with the controller.



Auscultation of the LVAD should sound like a steady high-pitched motor (aka "hum") without clunking sounds. EKGs will have an abnormal morphology, so compare them to prior EKGS – when available – to find subtle changes. Some VADs may cause electromagnetic interference with EKG monitoring; adjustment of lead placement may reduce the level of interference.

LVAD patients lack a reliable pulse, blood pressure reading, and oxygenation saturation. Assessment of the LVAD patient should focus on evaluating patient perfusion by clinical signs rather than traditional methods of vital sign measurement. **Treat the patient, not the pump!** If the patient has signs of adequate perfusion, assess and treat for non-LVAD causes of patient deterioration. Common complications in VAD patients include:

- Sepsis/Infection (don't forget to look at the skin where the driveline exits)
- Stroke/TIA
- Bleeding (VAD patients are on anticoagulation medication)
- Arrhythmias
- Cardiac tamponade
- CHF
- Aortic insufficiency

LVAD patients are preload dependent. Dehydration is common and nitrates should be used very cautiously. Look for causes of low fluid volume, especially hemorrhaging due to anticoagulation.
Pacing and defibrillation can be safely performed on VAD patients. Clinical judgement must be used when deciding whether or not to perform chest compressions. Medical Control and the patient's VAD Coordinator can help to guide this decision.

For any VAD related issue, the patient's VAD Team can be contacted 24/7/365. Within Region One, Ochsner Medical Center's VAD Coordinator if available via page at 504-842-3000. Do not stop the pump unless advised by the VAD Coordinator.

Device-related complications in VAD patient are uncommon but do occur. User-related complications happen much more often. Alarm types vary between VAD brands; however, as a general rule, the more persistent the alarm sound with red lights, the worse the problem and the higher potential for critical failures. Most VADs also have yellow warning lights that indicate a malfunction that is non-emergent but should be evaluated. A good first pass at solving alarming LVAD's is to check all connections- is the driveline fractured, is it connected to the controller, and are the batteries connected and charged. The LCD display on the controller will also help to identify the problem.

- If patient is experiencing VAD-related complications or cardiovascular problems, expedite transport to the medical facility where VAD was placed if patient's clinical condition and time allows

- If a patient has a functioning VAD and is experiencing a non-cardiovascular-related problem, transport to a facility that is appropriate for the patient's main presenting problem without manipulating the device.

The International Consortium of Circulatory Assist Clinicians produced an EMS Field Guide document to assist prehospital providers caring for VAD patients. There are multiple pages for each model of device approved for home use. The Consortium assigned a color for each device (as depicted below). The color borders of each page match the color code tag usually visible on the patient's controller. The current version of the EMS Field Guide can be accessed online at www.mylvad.com/medical-professionals/resource-library/ems-field-guides.

[7] HFSA/SAEM/ISHLT clinical expert consensus document on the emergency management of patients with ventricular assist devices. *The Journal of Heart and Lung Transplantation, 38(7):*677-698.
[8] Photo provided by Givertz et al. 2019.

MyLVAD EMS Field Guide

Prehospital personnel are advised to transport as much of the VAD equipment as possible with the patient so advanced troubleshooting can be performed at the VAD center.

HEARTMATE III

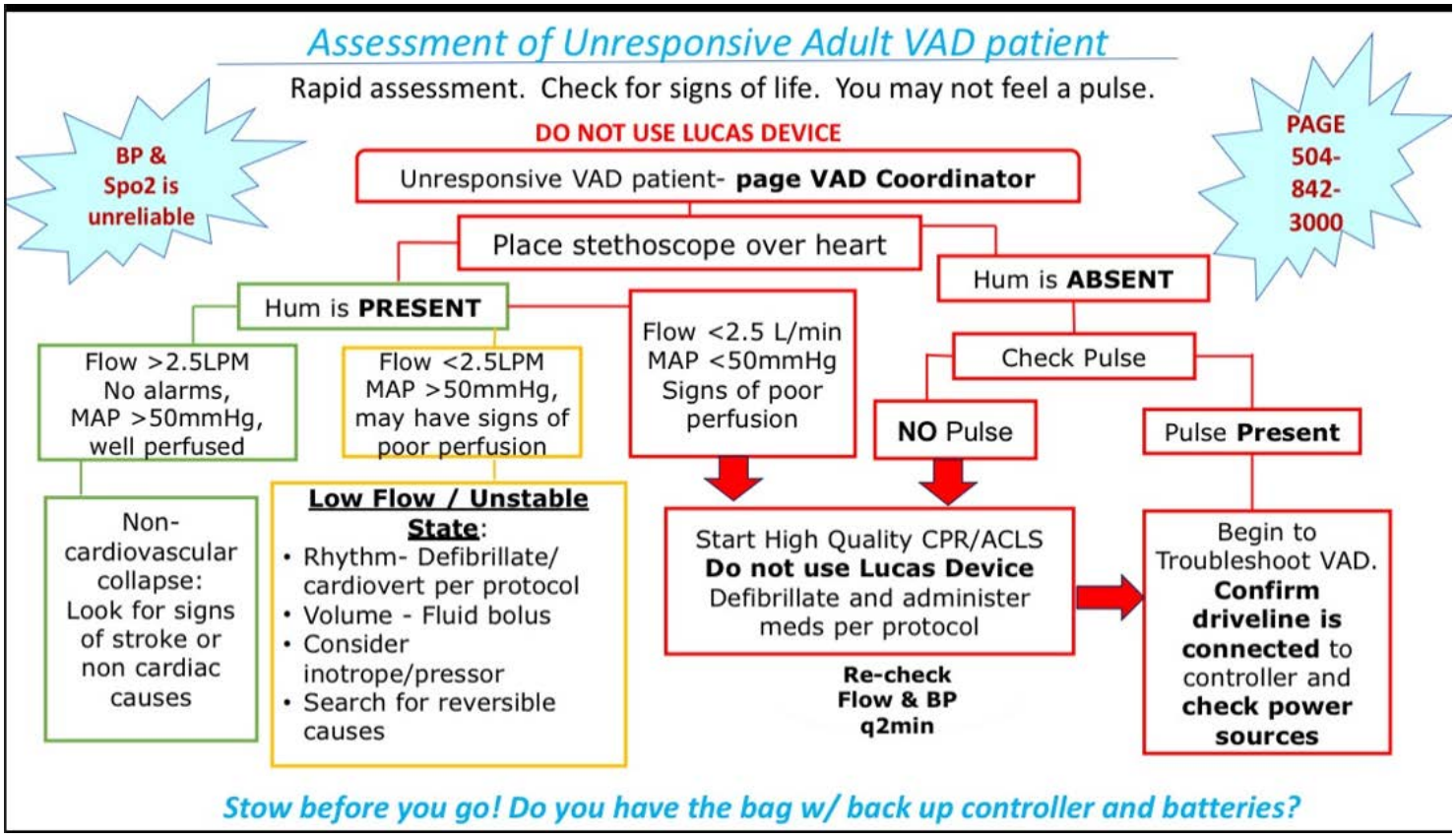
JARVIK 2000

HEARTMATE II

FREEDOM DRIVER
Total Artificial Heart

HEARTWARE

Look for a tag on the patient's VAD Controller



Total Artificial Heart (aka Artificial Heart)[9]

A total artificial heart (TAH) is a device that replaces both the right and left ventricles of the heart in addition to the four heart valves. A TAH occupies the space of the removed, failing heart. Patients with a TAH will have a pulse, and a blood pressure (both systolic and diastolic) should be able to be measured. Heart can usually be auscultated without a stethoscope. **Asystole is the patient's underlying cardiac rhythm and there is no need to obtain an EKG. Patients with TAHs do not respond to external CPR. Additionally, do not give vasopressive IV drugs to patients with a TAH.**

Photo provided by newswise.com

Currently there is only one commercially approved TAH – the SynCardia temporary TAH. The Freedom portable drive is the external machine used to drive the SynCardia. The EMS field guide to LVADs also has reference pages for the TAH Freedom Driver System. (See previous section for QR code/link)

VI. VASOPRESSOR USE

In emergencies, peripheral administration of vasopressors can be safe and is unlikely to cause tissue injury if done for a short period of time. Peripheral administration of vasopressors should ideally be given in larger, more proximal veins; the patient's antecubital fossa is considered a first line site for administration. If loss of patency is suspected, providers should stop the infusion immediately, obtain alternate IV or IO access, and notify the receiving facility of the possible extravasation.

Bolus Dose Vasopressors, aka Push Dose Epinephrine

Administration of bolus doses of vasopressors has been shown to be effective in hemodynamically unstable patients. Using "code" or "cardiac" epinephrine (1:10,000 Epinephrine) serves a temporary means of increasing blood pressure and preserving end-organ perfusion while volume resuscitation and vasopressor infusion are being initiated.

To make push dose epinephrine it first needs to be diluted. This is done by using a 10ml Normal Saline (NS) flush syringe, discarding 1 ml of NS, and drawing 1ml of cardiac epinephrine into the syringe. Push doses are then administered in 1-ml increments.

Providers may consider Push-Dose Epinephrine when outlined in a disease-specific guideline. The appropriate trigger and endpoint for utilizing push dose epinephrine remains to be determined. Additionally, the adverse effects of overdose are marked if providers do not mix push-dose epinephrine

correctly. All providers should use caution when drawing up and administering this medication. Medical Control should be consulted as needed.

Vasopressor Infusions

1. Epinephrine

Initial Epinephrine infusion rates usually range from 2-10 mcg/min.

For an Epinephrine solution containing 8 mcg/ml:

1. Mix 2mg of Epinephrine 1mg/ml (1:1000) into 250 ml of NS or D5W
2. Label bag "Epinephrine 8mcg/ml"
3. Administer infusion through a microdrip set (60 gtt/ml) at the following rates:

Epinephrine Infusion 8mcg/ml via Microdrip (60 gtt/ml) Set

Dose	2mcg/min	3mcg/min	4mcg/min	5mcg/min	6mcg/min	7mcg/min	8mcg/min	9mcg/min	10mcg/min
drops/min	15	22	30	38	45	52	60	68	75

For "Push Dose" Epinephrine solution utilizing 1:10,000:

1. First needs to be diluted. This is done by using a 10ml Normal Saline (NS) flush syringe, discarding 1 ml of NS, and drawing 1ml of cardiac epinephrine (1: 10,000) into the syringe.
2. Push doses are then administered in 1-ml increments.

2. Norepinephrine

Initial Norepinephrine infusion rates usually range from 2-12 mcg/min.

For a Norepinephrine solution containing 8 mcg/ml:

1. Mix 2mg of Norepinephrine into 250ml of NS or D5W
2. Label bag "Norepinephrine 8 mcg/ml"
3. Administer infusion through a microdrip set (60gtt/ml) at the following rates:

Norepinephrine Infusion 8mcg/ml via Microdrip (60 gtt/ml) Set

Dose	2mcg/min	3mcg/min	4mcg/min	5mcg/min	6mcg/min	7mcg/min	8mcg/min	9mcg/min	10mcg/min
drops/min	15	22	30	38	45	52	60	68	75

For a Norepinephrine solution containing 16 mcg/ml:

1. Mix 4mg of Norepinephrine into 250ml of NS or D5W
2. Label bag "Norepinephrine 16 mcg/ml"
3. Administer infusion through a microdrip set (60gtt/ml) at the following rates:

Norepinephrine Infusion 16mcg/ml via Microdrip (60 gtt/ml) Set

Dose	2mcg/ min	3mcg/ min	4mcg/ min	5mcg/ min	6mcg/ min	7mcg/ min	8mcg/ min	9mcg/ min	10mcg/ min	11mcg/ min	12mcg/ min
Drops/ min	8	11	15	19	22	26	30	34	38	41	45

Note: drops/min is the same as ml/hr when using a 60gtt/ml set

VII. ADDITIONAL CARDIAC INFUSIONS

Amiodarone

Loading Dose

The recommended initial IV loading dose of Amiodarone is 150mg. When given to patients with a pulse it should be administered over ten minutes. While the drug may be infused undiluted, it is preferable to mix Amiodarone into NS or D5W.

To administer Amiodarone 150 mg over 10 minutes:

1. Mix 150 mg of Amiodarone into 150 ml of NS or D5W.
2. Label bag "Amiodarone 150 mg"
3. Using a 10 gtt/ml macro drip set administer infusion at 150 drops/min
   Using a 15 gtt/ml macro drip set, administer infusion at 225
   drops/min.

If using a premixed bag of Amiodarone with a different volume or concentration, providers must calculate the appropriate drip rate.

Maintenance Infusion

Following the loading dose (either pushed during resuscitation or given over 10 min), a continuous infusion of Amiodarone should be given at 1mg/min – (60 drops/min when using a micro drip – 60 gtt/ml - set). Additional boluses of Amiodarone 150 mg are sometime indicated for recurrent arrythmias; Medical Control should be contacted if an additional bolus is considered indicated.

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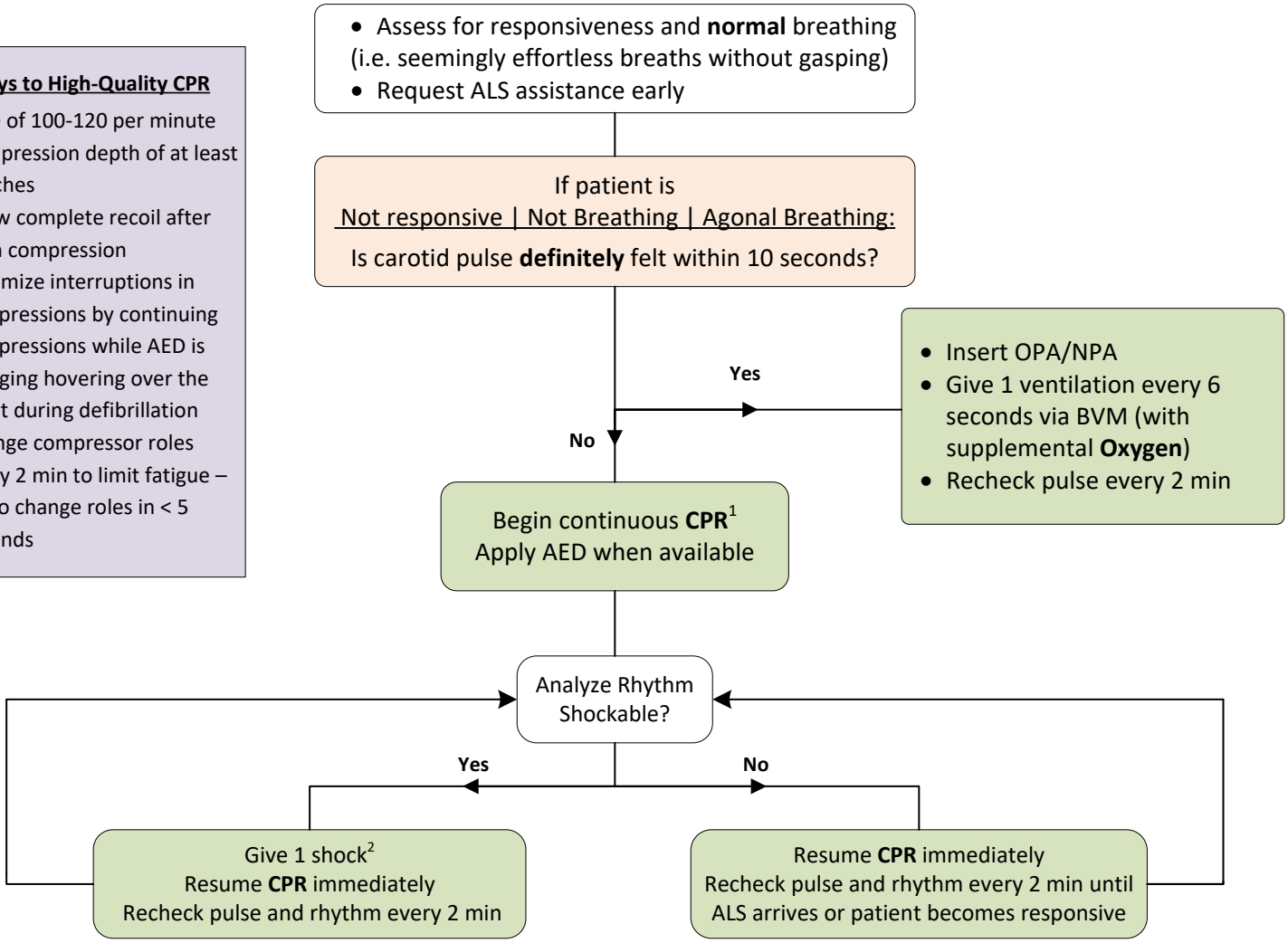
BLS Cardiorespiratory Arrest

Keys to High-Quality CPR

- Rate of 100-120 per minute
- Compression depth of at least 2 inches
- Allow complete recoil after each compression
- Minimize interruptions in compressions by continuing compressions while AED is charging hovering over the chest during defibrillation
- Change compressor roles every 2 min to limit fatigue – try to change roles in < 5 seconds



Following the initial rhythm check and/or shock:

- Consider applying a mechanical CPR device, if available
- Consider inserting a supraglottic airway (without interruption of compressions)
- Apply Impedance Threshold Device, if available

[1] **Promptly initiating and maintaining effective and continuous chest compressions is most important – CPR is a treatment! Airway management should not interfere with chest compressions or defibrillation. Provide ventilations at 10 breaths per minute.**

[2] In cases of witnessed arrest or adequate & uninterrupted bystander CPR performed prior to first responder arrival, it is reasonable to defibrillate as soon as possible after chest compressions are initiated. **CPR should not be delayed while applying pads or charging.**

[3] An impedance threshold device prevents unnecessary air from entering the lungs during the decompression phase of CPR – this decreases pressure and allows more blood to return back to the heart. Remove the ITD upon return of spontaneous circulation.

The effectiveness of CPR decreases with movement.
Resuscitation should occur on-scene for a minimum of 30 minutes if it is safe and operationally possible.

Cardiac Arrest

Remember:
"Pit Crew" CPR includes one team member working solely as the CODE leader when able

Confirm patient is apneic and pulseless
Begin **CPR**[1]

- Apply cardiac monitor and defibrillation pads
- Assess cardiac rhythm

Ventricular Fibrillation/ Pulseless Ventricular Tachycardia

Defibrillate at Maximum Joules[2]
Resume **CPR** immediately

- Establish IV/IO access (proximal humerus IO is preferred)
- **Epinephrine 0.1mg/ml** (1:10,000) 1mg IV/IO q 3-5 min x **3 doses MAX**
- **Amiodarone 300mg IV/IO**
- **Crystalloid Fluid** bolus 1-2L IV/IO
- Insert advanced airway (ETT or SGA)
- Initiate continuous $EtCO_2$ monitoring
- Apply Impedance Threshold Device (ITD)[3], if available
- After 2nd shock: **Amiodarone 150mg IV/IO**

If VF/pVT persists:

Defibrillate → **CPR** → Rhythm Check q2min until ROSC, asystole, or PEA

If torsade de pointes: Magnesium Sulfate 2g IV/IO

Consider double sequential defibrillation after three shocks

Search and treat reversible causes

Asystole/PEA

- Establish IV/IO access (proximal humerus IO is preferred)
- **Epinephrine 0.1mg/ml** (1:10,000) 1mg IV/IO q 3-5 min x **3 doses MAX** *If ROSC achieved then lost again can give additional 3 doses of Epi
- **Crystalloid Fluid** bolus 1-2L IV/IO
- Insert advanced airway (ETT or SGA)
- Initiate continuous $EtCO_2$ monitoring
- Apply Impedance Threshold Device (ITD)[3], if available

Search and treat reversible causes

Continue **CPR** with rhythm/pulse check q2min until ROSC or Termination of Resucitation (all pauses should last < 10 seconds)

NOTE:
ALS Provider May STOP CPR after 20 min if in ASYSTOLE on initial rhythm and ETCO2 is < 20 if CODE is unwitnessed and remained ASYSTOLE throughout

Reversible Causes of Cardiac Arrest

Hydrogen Ion (Acidosis) –
Hyperkalemia – Calcium Chloride 10% 1000 mg IV/IO
Hypothermia – rewarming (see **Hypothermic Cardiac Arrest** guideline)
Hypoxemia – Supplemental Oxygen
Hypoglycemia – Dextrose
Hypovolemia – Crystalloid Fluid bolus
Tension Pneumothorax – needle decompression°
Toxins – e.g. Opiates (Naloxone), TCAs (Sodium Bicarbonate)*
Thrombosis, pulmonary°
Thrombosis, cardiac
Tamponade°

*** Look for wide QRS**
° Look for narrow QRS

Promptly initiating and maintaining effective and continuous chest compressions is most important – CPR is a treatment!
Airway management should not interfere with chest compressions or defibrillation. Provide ventilations at 10 breaths per minute.

[1] In cases of witnessed arrest or adequate & uninterrupted bystander CPR performed prior to first responder arrival, it is reasonable to defibrillate as soon as possible after chest compressions are initiated. **CPR should not be delayed while applying pads or charging.**

[2] Maximum dosing is determined by the defibrillator's manufacturer guidelines. If unknown, use the highest setting possible.

[3] An impedance threshold device prevents unnecessary air from entering the lungs during the decompression phase of CPR – this decreases pressure and allows more blood to return back to the heart. Remove the ITD upon return of spontaneous circulation.

- The effectiveness of CPR decreases with movement. Resuscitation should occur on-scene if it is safe and operationally possible.
- Rarely, effective CPR can induce varying states of consciousness (e.g. eye opening, speech, spontaneous movement). Give **Ketamine** 1mg/kg IV/IO for sedation and amnesia. Also consider pseudo-PEA (i.e. severe shock) in these patients and monitor closely for ROSC.
- Cardiac arrest in pregnancy: Focus on high-quality CPR and left lateral uterine displacement. Defibrillate the same as non-pregnant patients. Consider early transport for peri-mortem C-section. See **Cardiac Preambles** and/or consult **Medical Control** for further guidance.

Post Resuscitation Care

Repeat Primary Assessment

Remain on scene to stabilize the patient

Positive outcomes decrease with hypoxia hyper/hypocapnia, hypotension, and fever. Focus on the prevention of these elements

Optimize Oxygenation & Ventilation

- Insert advanced airway (if not already done) as per **Airway Management** guideline
- Ventilate at 10 breaths/min (1 every 6 seconds)[1]
- Maintain SpO2 92-98% and EtCO2 30-40mmHg
- Elevate head of bed 20-30 if able
- Avoid hypoxemia and hyperventilation

Manage Shock
(SBP <90mmHg or MAP < 65mmHg)

- **Crystalloid fluid bolus** 500 ml
- Consider Vasopressor Infusion
  Norepinephrine 2-12 mcg/min
  or
  Epinephrine 2-20 mcg/min

titrate to MAP > 65mmHg
(use **Shock** guideline as needed)

[3]Consider **Push Dose Epinephrine** while preparing vasopressor infusion

Mix in syringe 1ml of 1mg/10ml Epinephrine with 9 ml of NS (syringe = 10mcg/ml Epinephrine)

Give 1ml IV/IO q3-5 min prn

Obtain 12-lead EKG

- Alert hospital if STEMI
- If VF/VT during resuscitation, give **Amiodarone** 150mg IV/IO (if bolus dose was not already given) over 10 minutes followed by 1mg/min IV/IO infusion
- Treat other dysrhythmias per appropriate **Cardiac** guideline[2]
- Identify and treat reversible causes of arrest (i.e. H's and T's)

- Transport to appropriate receiving facility[4]
- Monitor closely for deterioration and/or re-arrest[5]
- If re-arrest occurs, treat as per **Cardiac Arrest** guideline

Consult **Medical Control** for additional orders or consultation

[1] Avoid hyperventilation! Hyperventilation decreases venous return to the heart and can lead to hypotension.

[2] Ventricular ectopic beats should be presumed to represent unstable VT if ≥ 3 sequential wide complex beats are visualized.

[3] Surface cooling: apply ice/cold packs to the axilla and groin or use a commercial device for passive cooling. Do not use cooled IV fluids.

[4] Consider transport to a facility with cardiac catheterization capability and/or continuous targeted temperature management.

[5] Be prepared for seizures due to brain injury. Treat observed seizures with benzodiazepines as per **Seizure** guideline.

Bradycardia

This guideline is intended for symptomatic patients
(e.g. altered LOC, chest pain, pulmonary edema, seizure, syncope, shock, pallor, diaphoresis)
Bradycardic individuals who are perfusing well and do not have symptoms usually do not require emergency treatment.

Trancutaneous pacing (TCP) is a temporizing measure to transvenous pacing and a pacemaker.

Notify receiving hospital of TCP prior to arrival.

Routine Medical Care
confirm HR <60

Obtain 12 lead EKG
& identify rhythm

Atropine is NOT effective for Mobitz II 2° and 3° AV blocks as well as transplanted and total artificial hearts.

Initiate transcutaneous pacing immediately.

Is patient adequately perfused?

Yes

- Support ABCs
- Look for & treat reversible causes of bradycardia
- Treat other complaints per appropriate guideline
- Monitor/reassess rhythm during transport

No

- Prepare for trancutaneous pacing (TCP)
- Consider **Atropine** 0.5mg IV/IO q3-5 min[1] (max total dose = 3mg)
- In periarrest situations[2], consider **Push Dose Epinephrine** (alternative to atropine) 10 mcg IV/IO q2min to maintain MAP ≥ 65mmHg

Initiate TCP if patient remains symptomatic:

- Premedicate with **Midazolam** 2.5 – 5 mg IV/IO/IN or **Ketamine** 1mg/kg IV/IO/IM (max 200mg), if possible, for sedation[3]
- Set rate between 70-80 bpm
- Start strength at 50 mA, increase output quickly until complete capture is achieved (i.e. a wide QRS complex follows every pacer spike)
- Confirm capture – palpate pulse and observe HR on pulse oximeter[4]
- As a safety margin, set strength 10mA above amount used to capture

Consider Reversible H's & T's

- Hypovolemia
- Hypoxemia
- Hydrogen ion (acidosis)
- Hypo/hyperkalemia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins (e.g. β or Ca^{2+}blockers)
- Thrombosis, pulmonary (PE)
- Thrombosis, cardiac (MI)

Consider **Push Dose Epinephrine** while preparing pressor infusion

Mix in syringe 1ml of 1mg/10ml Epinephrine with 9 ml of NS (syringe = 10mcg/ml Epinephrine)

Give 1ml IV/IO q3-5 min prn

If patient still symptomatic:

Consider **Epinephrine drip** 2mcg/min IV/IO (max 10mcg/min) *titrate to MAP ≥ 65*

The differential diagnosis for bradycardia is broad - consider MI, hypoxia, pacemaker failure, hypothermia, overdose, cholinergic agents, head injury with increased ICP, stroke, spinal cord lesion, hyperkalemia, sick sinus syndrome, AV blocks, sinus bradycardia, athleticism.

[1] Do not delay pacing in order to administer atropine. Caution using atropine in the setting of acute MI; most cases of bradycardia during STEMI are due to heart block and may involve the right ventricle. Pacing +/- epinephrine is preferred in these instances.

[2] Bradycardic periarrest occurs when patients are in a decompensated state with progressive instability and deteriorating vital signs. These patients require emergent therapy to avert progression to full arrest. Start with aggressive treatments in these patients.

[3] If patient is alert, explain to them the procedure you are about to do. Look for a wide QRS complex with tall, broad T-waves as a sign of successful capture; do not be fooled by pacing artifact and false capture. Document the time, rate, current, and response to treatment.

[4] During TCP, the monitor's heart rate reading should not be considered reliable. Use the heart rate on the pulse oximeter. If unable to obtain a heart rate, look for other signs and symptoms to determine if patient's perfusion is improving.

Tachycardia

[1]Signs of poor perfusion include but are not limited to hypotension, altered LOC, weak pulses, delayed capillary refill, and hypoxemia

[2]Higher energies are recommended in patients that are overweight/obese (BMI ≥ 25 kg/m2) and associated with improved first shock success.

[3]Sync mode is indicated by a marker on the defibrillator screen noting each QRS complex.

[4]If unable to determine whether narrow rhythm is regular or irregular, give Adenosine 6m IV/IO as a diagnostic tool to slow the rate. IO Adenosine should only be given in proximal humerus.

[5]Success rates with Valsalva maneuver in terminating SVT range from 19% to 54%. Maneuvers should be performed while preparing adenosine and should not delay adenosine use.

[6]Monitor for hypotension & bradycardia after Diltiazem and Metoprolol use.

Routine Medial Care
Confirm HR >150

Obtain 12 lead EKG

Is rhythm sinus tachycardia?

Yes

- Identify and treat underlying cause (e.x. pain, dehydration)
- Measure Shock Index – manage per **Shock** guideline, if needed

No

Is patient adequately perfused?[1]

No

- Premedicate with **Midazolam** 2.5-5mg IV/IO/IM for sedation, if needed/able
- Perform **Cardioversion**[2]:

Synchronized[3]
Narrow or wide regular: 100 J
Narrow irregular: 200J

Unsynchronized (i.e. Defibrillate)
Wide irregular: max Joules and proceed to **Cardiac Arrest** guideline

Yes

- Identify EKG rhythm
- Measure QRS complex

Narrow QRS[4] (< 0.12 sec)

Regular rhythm
Consider SVT

Valsalva Maneuver[5]
Apply Ice to Face

Adenosine 6-12mg rapid IV/IO

If no rhythm change:

Adenosine 12mg rapid IV/IO

If no rhythm change:

Dilatiazem 10 mg slow IV/IO[6]
(may repeat x 1 after 5 min)
- or -
Metoprolol 5 mg slow IV/IO[6]
(may repeat x 2 after 5 min)

Irregular rhythm
Consider Afib/AFlutter

Dilatiazem 10 mg slow IV/IO[6]
(may repeat x 1 after 5 min)
- or -
Metoprolol 5 mg slow IV/IO[6]
(may repeat x 2 after 5 min)

Contact **Medical Control** for additional orders or consultation

Wide QRS (≥ 0.12 sec)

Regular rhythm
Consider VT

Amiodarone 150 mg in 100 ml D_5W over 10 minutes

Upon conversion, **Amiodarone** 1 mg/min IV/IO infusion

If torsades de pointe (polymorphic VT):

Magnesium Sulfate 1-2 grams IV over 10 minutes

Irregular rhythm
Consider Afib with aberrancy, MAT, polymorphic VT

Amiodarone 150 mg in 100 ml D_5W over 10 minutes

Upon conversion, **Amiodarone** 1 mg/min IV/IO infusion

If torsades de pointe (polymorphic VT):

Magnesium Sulfate 1-2 grams IV over 10 minutes

Chest Pain – Suspected Acute Coronary Syndrome (ACS)

The term ACS includes unstable angina (UA), non-ST elevation MI (NSTEMI), and ST elevation MI (STEMI).
Assess and treat life-threatening arrythmias prior to utilizing this guideline

Routine Medical Care

Aspirin 162-325mg[1] PO

12-Lead EKG

EKG shows ST elevation MI[2]?

Yes

- Minimize scene time (<15 min)
- Alert receiving hospital and transmit EKG as early as able

No

If SBP > 100 mmHg:

SL Nitroglycerin 0.4mg SL q3min prn for chest pain (max 3 doses)

- Consider analgesia for severe, unrelieved chest pain:
  - **Fentanyl** 25-50mcg IV/IO/IN/IM q2min prn (max 200mcg)
  - - or -
  - **Morphine** 2-4mg IV/IO/IM q2min prn (max 10mg)
  - - or -
  - **Ketorolac [Toradol]** 15mg IV/IM **Do Not Utilize on RENAL or GI Bleed Patients**
- Consider **Ondansetron** 4 mg IV/IO/PO prn (max 8mg) for nausea/vomiting with active pain - or -
- **Droperidol** 1.25 mg IV **exclude ages >65yo and <12yo**
- Give oxygen if SpO_2 <90%, dyspnea, or signs of CHF (goal SpO_2 = 90-94%)

- Transport to a hospital with cardiac catheterization capability
- Perform serial EKGs while en route to hospital
- Observe and treat patient for signs of clinical deterioration (e.g. dysrhythmias, SOB, shock) – apply defib pads if not already done

[2] **Remember to look for Posterior STEMIs!**

- You will see ST depressions (often >2mm) in V1-V3.
- Posterior EKG (leads V7-V9) with ST elevation will confirm the diagnosis.

Isolated LBBB in a stable patient is not an indication for STEMI activation

NTG Contraindications

- SBP < 100mmHg
- Recent use of erectile dysfunction medication (Viagra/ Levitra within 24 hours, Cialis within 48 hrs)

Suspected RV infarct[3] is a relative contraindication (monitor for hypotension)

- ACS can present atypically – consider a cardiac etiology when patients reports SOB, sweating, nausea/vomiting, dizziness, syncope, or vague/generalized complaints. Atypical symptoms are most common in women, the elderly and diabetic patients.
- Document the patient's cardiac risk factors (outlined in the **Cardiac Preambles**) in the EMS Run Report.

[1] Document patient's own aspirin use within the last 24 hours. **Aspirin (ASA)** is contraindicated in patients with current and recent GI bleeding. The term "recent" includes bleeding requiring hospitalization or blood product transfusion within the last 6 months.

[2] **Nitroglycerin (NTG) -** If blood pressure drops significantly after a single NTG dose, discontinue NTG use. Treat NTG-induced hypotension (SBP <100) with **Crystalloid fluid bolus** 250 ml IV.

[3] Consider an RV infarct in all inferior STEMIs (leads II, III, AvF) with hypotension. ST elevation in lead V4R (obtain a right sided EKG) helps to make this diagnosis. Hypotension and bradycardia are common.

[4] Morphine use in NSTEMI is controversial and may inhibit antiplatelet medications. Use opiates judiciously.

CHF | Acute Pulmonary Edema

Medical History Indications

- Hx of CHF, MI, AFib, Renal Failure
- Use of diuretics
- New or increasing dyspnea on exertion (DOE)
- Increasing Pillow orthopnea
- Paroxysmal Nocturnal Dyspnea
- Prior Intubation

Physical Exam Indications

- Dyspnea
- Cough with sputum
- JVD at 30° elevation
- Lower extremity edema
- Rales / Rhonchi
- Tachycardia
- Hepatojugular Reflux[1]

Routine Medical Care

Early **CPAP** 5-10cm H_2O

Blood Pressure
and
12-Lead EKG
to assess for STEMI[2]

SBP ≥ 100mmHg and severe respiratory distress

[3] **SL Nitroglycerin** 0.4mg q5min prn for dyspnea
no max dose if SBP≥ 100mmHg
(may give 0.8mg q5min prn if age < 65 yo and SBP > 200mmHg)

For Anxiolysis -A level of sedation in which a person is very relaxed and may be awake
Midazolam 2.5 mg IV/IO/IM

If failing above therapy:

- Discontinue CPAP and ventilate using BVM with PEEP valve
- Consider/prepare for advanced airway
- Consider potential CHF complications and alternative diagnoses (e.g. equipment failure, pneumothorax, shock)

Recycle and record BP q2-5min

NTG Contraindications

- SBP < 100mmHg
- Recent use of erectile dysfunction medication (Viagra/Levitra within 24 hours, Cialis within 48 hrs)

Suspected RV infarct[3] is a relative contraindication (monitor for hypotension)

[4]Consider **Push Dose Epinephrine** while preparing vasopressor infusion

Mix in syringe 1ml of 0.1mg/ml (1:10,000) Epinephrine with 9 ml of NS (syringe = 10mcg/ml of Epi)

Give 1ml IV/IO q3-5 min prn

Contact **Medical Control** for additional orders or consultation

SBP < 100mmHg and severe respiratory distress

[4]Initiate Vasopressor Infusion:
Norepinephrine 2-12 mcg/min
or
Epinephrine 2-20 mcg/min
*titrate to MAP ≥ 65mmHg

- Discontinue CPAP if SBP < 90mmHg and patient is showing signs of deterioration (e.g. worsening dyspnea, sustained hypotension, declining mental status)
- Prepare for advanced airway as outlined in **Airway Management (2 of 3)** guideline - **Can't Ventilate & Can Intubate**

Recycle and record BP q2-5min

[1] Hepatojugular reflux indicates right sided heart failure. With the patient sitting at a 30° angle, lightly palpate the abdomen over the liver. If the jugular veins rise ≈ 4cm = positive reflux.

[2] Consider myocardial infarction as a cause of pulmonary edema – transport to a facility with a cardiac catheterization lab if needed.

[3] Repeated doses of SL Nitroglycerin should be prioritized over topical nitroglycerin which takes at least 10 minutes to take effect. Diuretics have little value in treating acute pulmonary edema and are no longer considered first-line treatment.

[4] Consider an RV infarct in all inferior STEMIs (leads II, III, AvF) with hypotension. ST elevation in lead V4R (obtain a right sided EKG) helps to make this diagnosis. Hypotension and bradycardia are common.

Ventricular Assist Devices (VADs)

This guideline is intended for LVAD patients with a respiratory or cardiac complaint. Patients with a functioning VAD and a non-cardiopulmonary complaint should be managed be the appropriate **Medical**, **Trauma**, and/or **HAZMAT** guideline. See **Cardiac Preambles** for further guidance on ventricular assist devices.

Flow through many VADs is continuous, not pulsatile.

Patient may not have a palpable pulse or accurate pulse oximetry

Look for the VAD model name on their controller (usually in the patient's pouch or pocket)

Routine Medical Care including $EtCO_2$

- Assess oxygenation ventilation
- Treat any respiratory complaint(s) per appropriate medical guideline

Clinically assess circulation/perfusion

- e.g. mental status, skin color, capillary refill
- Do not rely on blood pressure readings unless a Doppler BP is able to be obtained[1]

Transport patient to an LVAD facility – preferably their own

Always transport patient's backup equipment bag with fully charged batteries and bring a caregiver when available

Is patient adequately perfused?

Yes

Adequate Perfusion (i.e. patient is stable)

- Assess/treat complaint according to appropriate guideline(s)
- Obtain 12 lead EKG[2]
- Contact patient's VAD Coordinator – especially prior to treating any stable dysrhythmia[3]

No

Assess LVAD

- Is the controller alarming?
- Auscultate chest for humming or whirling sound of the pump

OCHSNER MAIN is Region 1 LVAD Center contact the VAD Coordinator for All Patient Contacts 504-842-3000

Is LVAD functioning?

Yes

- Treat hypoperfusion[1] with **Crystalloid fluid bolus** 250ml IV/IO
- Monitor $EtCO_2$ (≤20 mmHg is consistent with hypoperfusion)
- If patient remains hypoperfused after IVF, start CPR with manual chest compressions and treat as per **Cardiac Arrest**[3] guideline
- Okay to pace, cardiovert, or defibrillate the hypoperfused/unstable patient[2]
- Contact patient's VAD coordinator

No

- Address display warnings on controller
- Ensure driveline is firmly attached to controller and controller is connected to a working power source
- Press battery charge indicator button to assess charge level
- Replace battery or controller if needed
- If LVAD does not restart, start CPR with manual chest compressions and treat as per **Cardiac Arrest**[3] guideline
- Contact patient's VAD coordinator

Contact **Medical Control** for additional orders or consultation

[1] Although automatic non-invasive BP cuffs are often ineffective in measuring systolic and diastolic pressures, if they do obtain a MAP it is usually accurate. A doppler BP measures the MAP. Avoid futile repeat attempts to obtain a blood pressure, pulse, or SpO_2.

[2] VAD patients still have underlying heart function and rhythms that should be assessed. Do not disconnect the LVAD to pace, cardiovert, or defibrillate. Apply defibrillator pads in the anterior/posterior position.

[3] The decision whether to cardiovert and perform CPR should be made based upon best clinical judgment. Early consultation with the patient's VAD coordinator and/or Medical Control is advised. Patients with a total artificial heart (TAH) will not respond to CPR.

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Region One Protocol Effort

Trauma Guidelines

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Trauma Preambles

The role of EMS in the treatment of critical trauma is recognition, rapid transport, and injury stabilization while en route to the most appropriate facility.

I. SCENE TIME

For critical trauma, the standard of care is an on-scene time of less than 10 minutes. Life threatening injuries identified on primary survey should be managed immediately with rapid transport to a trauma center; the secondary survey should be performed in route. Make every effort possible to expedite transport to the trauma center in less than 10 minutes.

When EMS dispatchers are aware of a "significant traumatic incident" (when scene time is critical) they should transmit a solid tone for no less than 3 -5 seconds when 8 minutes has elapsed, if available. The transmission of this tone will stand as a reminder to the crew(s) on scene that they are approaching a 10 minute scene time. After the tone is transmitted a verbal notification will be broadcasted. "Unit #" or "All units on Main St. this is your 8 minute notification," (repeat once) end the broadcast with "no notification response is needed."

II. TRAUMA ASSESSMENT

Primary Assessment

The primary assessment of trauma is performed to identify life-threatening problems. The provider should also recognize other significant problems that if not promptly treated will become life-threatening. Each of these conditions should be managed as soon as they are identified. Additionally, information gathered from the scene assessment should help the provider anticipate possible internal injuries.

Components of the primary assessment can and should be performed simultaneously. Pearls of each include the following:

- Massive Hemorrhage
  - Though airway management is generally the first step of resuscitation, patients with obvious external bleeding should be treated using the MARCH framework – this places the primary focus on controlling hemorrhage.

    - Massive Hemorrhage
    - Airway
    - Respirations
    - Circulation
    - Head injury/hypothermia

- "The Street" is considered one of the major locations for traumatic blood loss. Immediately control any major points of bleeding to stem the flow of blood.
  - Hold pressure first
  - Apply tourniquets to limb wounds - "High and Tight"
  - Apply pressure dressings, wound packing, and/or topical hemostatic agents to head, neck, and torso wounds

- Airway (with cervical spine control)
  - Suspect laryngeal trauma if the patient has laryngeal tenderness/swelling/bruising, voice changes, stridor, or respiratory distress.
  - Anticipate the potential for progressive airway compromise in patients with trauma to head and neck, including patients who have suffered burns.
  - Consider providing an advanced airway for patients with an altered level of consciousness (GCS ≤ 8)

- Breathing
  - The conversion of a simple pneumothorax into a tension pneumothorax is dynamic and sometimes rapid. A simple pneumothorax is identified by decreased or absent breath sounds. Ultrasound should be utilized, if available, for conformation of pneumothorax visualized as absent lung sliding.

  - Signs and symptoms of a tension pneumothorax include:
    - Tachypnea and rapidly worsening respiratory distress.
    - Absent breath sounds on the affected side.
    - Hypotension
    - Tachycardia
    - Diaphoresis
    - Tracheal deviation (LATE SIGN)
    - JVD

  - Needle decompression is NOT indicated for simple pneumothorax. Medical Control consultation on needle decompression may be considered, but is not required, especially when the patient is in traumatic cardiac arrest. Should clinical presentation dictate a tension pneumothorax and Medical Control is unable to be reached, proceed with the treatment.

- Circulation:
  - Internal hemorrhage in the abdomen and pelvis are common unidentified sources of shock. The primary places that patients can bleed internally are (1) the thorax, (2) the abdomen, (3) the pelvis, and (4) the long bones. Monitoring vital signs closely and understanding compensated versus decompensated shock enables treatment of massive hemorrhage early. If available an ultrasound should be utilized to perform an eFAST exam to check for presence of free fluid in the thorax, abdomen, and pelvis. Free fluid can usually be visualized before

signs and symptoms are present. EFAST exams should be performed with any trauma activation in which trauma to these areas may have occurred.

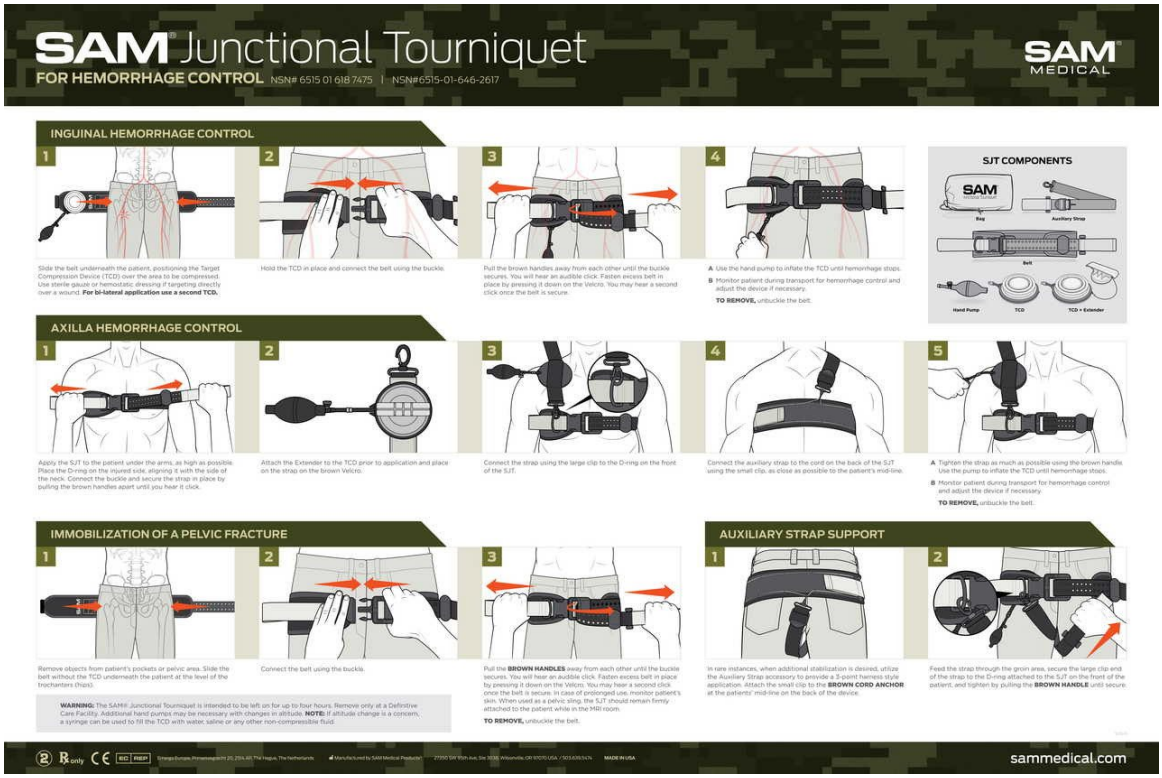
- **Compensated shock:** the body is able to maintain a normal blood pressure and organ perfusion by increasing its heart rate and constricting its blood vessels.

Signs and symptoms of compensated shock include:

- Tachycardia
- Narrowing pulse pressure
- Weak, thready peripheral pulses (ex. radial)
- Pallor or peripheral cyanosis

- **Decompensated shock:** the body is no longer able to maintain a normal blood pressure and organ perfusion is compromised. Signs and symptoms of decompensated shock include
  - Hypotension
  - Tachycardia
  - Weak, thready central pulses (ex. femoral, carotid)
  - Central cyanosis

- If the pelvis is unstable and the patient is hypotensive, apply a pelvic binder or sheet to stabilize the patient (pelvic binders offer no clinical benefit to controlling hemorrhage of isolated femur fractures).
- If available junctional tourniquets should be utilized for all exsanguinating junctional wounds.



Disability and Exposure are desired but not required parts of the primary trauma assessment. They should not be conducted until the ABCs have been assessed and managed.

Balanced Resuscitation & Permissive Hypotension

Excessive resuscitation with isotonic fluid in exsanguinating patients can increase blood pressure, disrupt unstable blood clots ("pop the clot"), and lead to worsening of bleeding.
Uncontrolled / Internal hemorrhage should be managed by "balanced resuscitation" ensuring that vital organs are perfused while not interfering with the body's own hemorrhage control. Only once bleeding is definitively controlled (i.e. surgery) should aggressive attempts be made to restore normal physiology and blood pressure.

It is recommended that a systolic BP of < 80mmHg, a change in mental status, or lost radial pulses be treated with 250ml incremental IV boluses while enroute to a trauma center. Patients who appear well perfused (ex. strong pulses, warm extremities) with a systolic BP of >80mmHg can be monitored closely and frequently without the administration of a crystalloid fluid bolus during transport.

In the right setting, resuscitation also should involve the early use of blood products (instead of crystalloid fluids like NS or LR) in ratios resembling that of whole blood. Tailor all resuscitation with fluid to the clinical setting and suspected etiology of hypovolemic shock. Be certain to consider non-hemorrhagic causes of hypotension (i.e. cardiac tamponade, tension pneumothorax).

Permissive hypotension is currently contraindicated in children and in patients with traumatic brain injury.

III. TRAUMATIC BRAIN INJURY

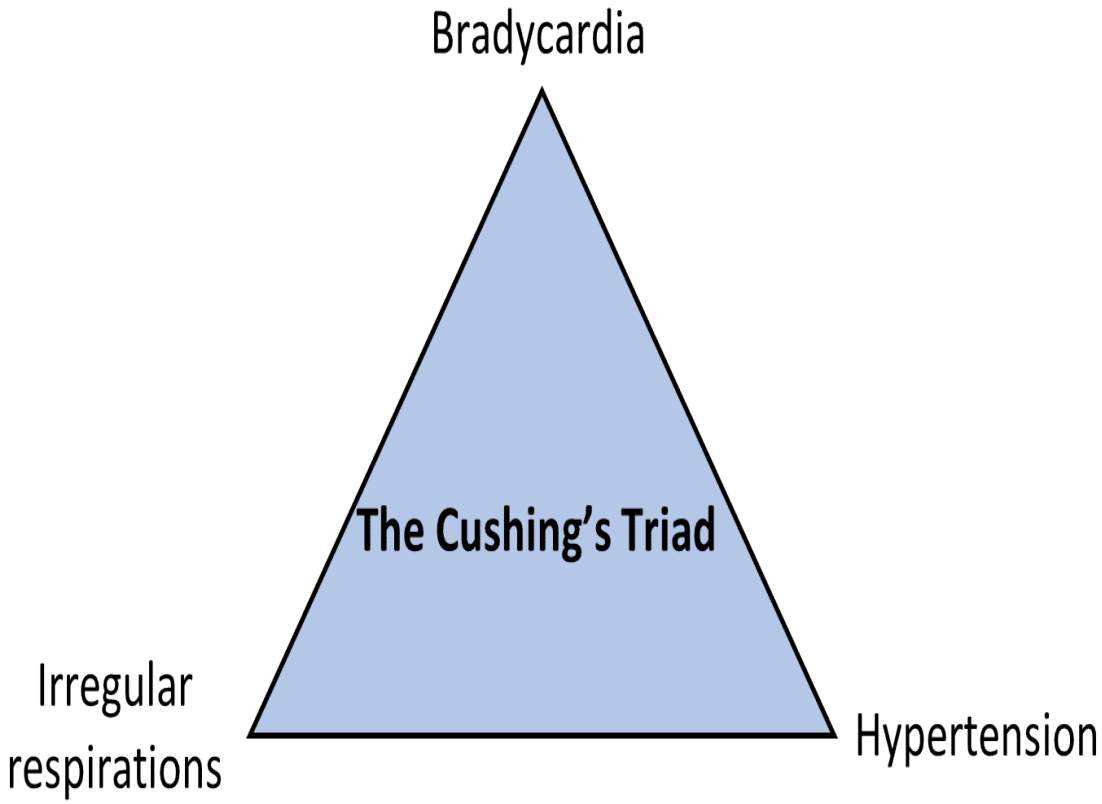
Common signs and symptoms of increased intracranial pressure include:

- Confusion
- Altered level of consciousness
- Dilated or unequal pupils
- Markedly increased systolic blood pressure
- Bradycardia
- Abnormal respiratory patterns

Priorities for the treatment of head injury patients include airway management, maintenance of adequate oxygenation & blood pressure as well as appropriate C-spine control & immobilization. Patient with suspected head injury should have the head of the bed elevated to 30^{o} during transport to decrease intracranial pressure (use reverse Trendelenburg if spinal precaution is needed).

Patients with traumatic brain injury may deteriorate as intracranial swelling and hemorrhage increase. If mental status declines during transport, reassess ABCs, repeat their neurologic status assessment, including GCS, and manage accordingly. Cushing's response refers to the ominous combination of markedly increased arterial blood pressure and resultant bradycardia indicating cerebral herniation.

Patients presenting with Cushing's Triad should be considered critical. Providers should prepare for rapid deterioration.


Bradycardia
The Cushing's Triad
Irregular respirations
Hypertension

Hypoxia should be avoided in head injury, in order to maintain cerebral perfusion. Head trauma patients should receive oxygen to keep Sp02 > 95%, preferably via nonrebreather mask. Patients with poor respiratory effort may require ventilation with a BVM at 8-10 breaths/min. Hyperventilation is no longer recommended as prophylactic intervention immediately after severe TBI.

Additionally, hypotension should be avoided in head injury. Hypotension decreases cerebral perfusion and worsens brain injury and must be corrected. Treat for hypovolemic shock if the patient's systolic BP is < 110mmHg.

Glasgow Coma Scale/Score

GCS is used to assess level of consciousness and make field triage decisions. It is a component of vital signs during trauma resuscitation. GCS can reliably be used with children older than 5 years with no modification. A pediatric GCS has been developed for pediatrics.

	Adult	Pre-verbal Children	Score
Best Eye Opening	Spontaneous To speech To pain/pressure No response	Spontaneous To speech To pain only No response	4 3 2 1
Best Verbal Response	Oriented Confused Inappropriate words Incomprehensible sounds No response	Coos & babbles Irritable/cries Cries to pain Moans to pain No response	5 4 3 2 1
Best Motor Response	Follows commands Localizes pain Withdraws to pain Abnormal flexion Extension No response	Moves spontaneously & purposefully Withdraws to touch Withdraws in response to pain Flexion in response to pain Extension in response to pain No response	6 5 4 3 2 1

It is no longer recommended to assign 1 point to non-testable elements. Any aspect of the score that cannot be tested should be noted as “NT”, for non-testable. The total GCS should be documented as the combined score of testable components. For example, GCS: E2, V NT, M 4.

GCS Classification of TBI

Traumatic brain injury is often classified as follows:

- Severe: GCS 3 to 8*
- Moderate: GCS 9 to 12
- Mild: GCS 13 to 15

* Patient with severe brain injury (GCS ≤ 8) may require advanced airway placement*

GCS measurement should be repeated 5 minutes after the first score is obtained.

IV. SPECIAL TRAUMA SCENARIOS

Traumatic Cardiac Arrest (TCA)

Persons who die in the prehospital setting have generally suffered high rates of bleeding in non-compressible areas. Survivors of traumatic cardiac arrest most frequently have pathologies that can be easily reversed once access to the patient is achieved. These pathologies include reversal of hypoxemia or hypoventilation, relief of tension pneumothorax, and immediate implementation of advanced life support in the group of patients who have sustained a "medical cardiac arrest" as part of or the cause of their "trauma episode."

Life-saving interventions (**HOT** interventions) during TCA address these reversible pathologies:

Hypovolemia:	• Control external hemorrhage
	• Splint pelvis/long bone fractures as needed • IV/IO fluid/blood administration
Oxygenation/ Ventilation	• Airway management (BVM, endotracheal intubation, supraglottic airway) • EtCO2 monitoring
Tension ptx	• Bilateral needle decompression
	• Consider Finger Thoracostomy - **ONLY Trained personnel with Approval of Medical Director may perform**

External chest compressions may be delayed while treating reversible causes; however, they should not be considered futile, particularly if a medical cardiac arrest is suspected.

The only well-established operative intervention which can result in neurologically good outcome in TCA is immediate thoracotomy for penetrating chest trauma.

Patient Extrication & Transport

If extrication from a vehicle is required, providers should first apply a cervical collar to the patient while they are still in the vehicle (if safe to do so). When indicated, adults and children in a booster seat should be allowed to self-extricate. For infants and toddlers already strapped into a car seat with a built-in harness, providers should extricate the child while strapped in his/her car seat.

When in other situations requiring patient extrication, a long board (preferably padded) may be used for extrication using the lift and slide (rather than logroll) technique. Prolonged immobilization on spine board can be very uncomfortable for the patient and can lead to ischemic pressure injuries to the skin. If available all voids should be padded, but should not delay extrication, treatment, or transport.

Children have disproportionally larger heads. When securing pediatric patients to a spine board, their body should be elevated approximately 1-2 cm to accommodate the larger head size and avoid neck flexion when immobilized. Additionally, children are abdominal breathers so immobilization straps should go across their chest and pelvis – not across their abdomen – when possible.

Protective Athletic Equipment & Suspected Spinal Injury

Helmets and shoulder pads are ONLY to be removed if they interfere with securing an airway or the ability to perform chest compressions.

Helmets should always be removed manually (rather than the use of an automated device). One provider should manually immobilize the neck while the other provider manipulates the helmet. The face mask portion of the helmet should be removed first, if able. Occipital and shoulder padding may be applied while the patient is in the supine position in order to maintain neutral cervical spine positioning. Removal should be performed with the help of the onsite athletic trainers.

Once the helmet is removed and a cervical collar is applied, padding that is part of the patient's uniform should also be removed. The helmet and pads should be considered one unit.

Facial/Dental Trauma

EMS providers should approach patients with facial and/or dental trauma by conducting **Routine Trauma Care** and prioritizing life-threatening injuries over the most apparently visible deformity. The primary assessment should focus on the patient's inability (or lack therefore) to keep their airway patent. Airway patency may be affected by an unstable midface (e.g. LeFort fracture), unstable mandible, or unstable dentition at risk of aspiration.

Providers should attempt to collect avulsed teeth or tissue, when able. Any lost teeth not recovered on scene may be in the patient's airway. Specific interventions include:

- Avulsed tooth
  (1) Avoid touching the root of the avulsed tooth. Do not wipe off the tooth.
  (2) Pick up the crown end of tooth. If dirty, rinse off under cold water or saline for 10 seconds. Do not scrub the tooth.
  (3) Place the tooth in milk or saline as the storage medium. Alternately, an alert and cooperative patient can hold tooth in their mouth using their own saliva as a storage medium.
- Eye trauma
  (1) Place eye shield for any significant eye trauma
  (2) If the globe is avulsed, do not put it back into socket. Cover with moist saline dressings and place a cup over it.
- Mandible unstable
  (1) Expect that the patient cannot spit/swallow effectively and have suction readily available.
  (2) Preferentially transport patient sitting up with emesis basin/suction available (at 30° if concern for spinal injury).
- Nose/ear avulsion
  (1) Recover tissue if it does not cause excessive scene time.
  (2) Transport tissue wrapped in dry sterile gauze in a plastic bag. Place plastic bag on ice if available (do not put ice directly into the bag with the avulsed tissue!)

- Epistaxis – have patient squeeze nose for 10-15 minutes continuously while leaning forward. **Patient should not be directed to drop head backward.**

Persons with dental or facial trauma are also at risk of cervical spine and traumatic brain injury – patients should be fully examined and monitored closely for these complications. Special re-examination geared toward airway and ability to adequately ventilated should also be performed.

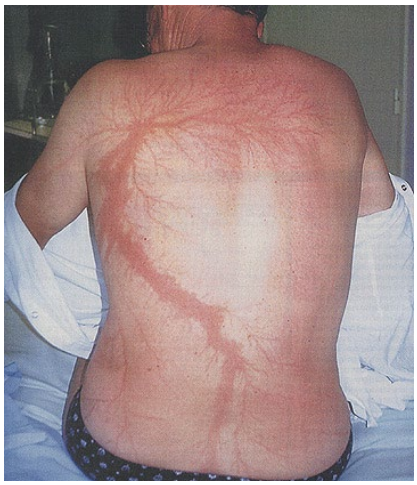
Lightning Strike Injuries[1]

Lightning strikes most commonly occur in outdoor environmental conditions that may also place EMS providers at risk of injury. Scene safety should always be the priority. Most frequently people are injured through ground currents created by a nearby strike as opposed to a lightning bolt making direct contact with the victim. Repeat lightning strikes have been known to occur, but victims do not carry or discharge a current – the patient is safe to touch and treat.

Lightning strikes cause a very high voltage for a very short duration; this can lead to dysrhythmias including ventricular fibrillation and asystole caused by the simultaneous depolarization of all myocardial cells. Additionally, the sudden electrical stun can temporarily paralyze the medulla's respiratory center, leading to prolonged apnea. Persons who experience cardiopulmonary arrest after a lightning strike have a higher rate of successful resuscitation compared to the general population. In the event of multiple lightning strike victims, "reverse triage" is recommended where cardiac arrest patients are given highest priority.

Patients frequently have fixed and dilated pupils after a lightning strike due to overstimulation of the autonomic nervous system and subsequent autonomic dysfunction – this clinical finding should not be confused as a sign of death or impending death. Neurologic insult may also cause stroke-like findings, seizure, lower extremity paralysis and memory deficits. Patients may also have cardiovascular and respiratory symptoms, including respiratory paralysis, apnea, and cardiac arrest.

Lightning strike patients also frequently experience thermal burns – these should be managed as per the **Burn Care** guideline. Lichtenberg figures ("ferning" or "feathering" on the skin) are a unique finding on the skin that is pathognomonic for lightning injury – they generally appear within one hour and last less than 24 hours.



It is not always immediately apparent that a patient has been a victim of lightning strikes; providers should remember to look for the more subtle findings and injury patterns.

Conducted Electrical Weapons (e.g. TASER) – aka Electronic Control Devices (ECDs)

Conducted electrical weapons deliver an electric shock with the intent to cause pain and/or disrupt muscle function. A TASER device is the most commonly used ECD by law enforcement agencies to quickly stop a subject from resisting or fighting. TASERs may be used one of two ways:

1) In the *probe* mode an officer maintains distance from the subject and launches two tiny probes (i.e. barbs) that attach to a person's clothing or skin. These barbs allow a circuit of electricity to deliver a shock that incapacitates neuromuscular groups.

2) In *drive-stun* mode, the officer is in close contact with the subject and the TASER applies a direct shock, but no probe is fired – this mode causes pain but is not incapacitating.

Under certain circumstances EMS will be summoned to evaluate and treat TASER victims. These instances include:

1. The person requests EMS
2. Person was unconscious, even for a short period
3. Person had a visible seizure outside of when Taser© was discharged
4. Person has obvious significant injury from a fall or take-down
5. Person volunteers that they are having chest pain or trouble breathing
6. Person has persistent confusion or altered mental status for more than one minute after application of conducted electrical weapon
7. Person is displaying signs concerning for hyperactive delirium with severe agitation (see below)
8. Victim of a TASER used by a member of the public (i.e. non-police use)
9. TASER probe is embedded in a sensitive area (head, neck, hands, feet, groin, or female breast)
10. If an officer has any doubt as to the health of the person based on:
    a. the officer's training
    b. the officer's previous use of a TASER
    c. the subject exhibits any of the conditions and/or symptoms above
    d. the subject exhibits any unusual behavior

Whenever possible, law enforcement officers should accompany patients under custody in the transporting unit to the hospital.

[1] https://www.emra.org/emresident/article/when-lightning-strikes/

Patient Management after TASER Injury

THIS IS A COMPLEX PATIENT. During the evaluation of a TASER victim, one should question why the individual first required apprehension. Typically, it is not an ECD itself that leads to the need for transport to a hospital - it is rather the underlying pathology that led to the officer deploying the ECD. Hyperactive delirium with severe agitation, toxic substance use, medical disease (ex. DKA, hypoglycemia), or mental illness are common examples.

Police officers should provide EMS personnel with as much information as possible about (a) the events leading up to TASER deployment, (b) specifics of the TASER deployment [mode(s) used, how many TASER cartridges were used, length of shock], and (c) changes in the victim's behavior after being shocked. Medical documentation should include the location of all barbs removed, regardless of whether removed by Police or EMS. Documentation should also include securing techniques used by both Police and EMS to restrain the patient. Patients should not be restrained in a prone, face-down, or hog-tied position – these increase the risk of respiratory compromise and compressional asphyxia.

- Trauma Care:
  - Patients who have received an ECD may have already been involved in a physical confrontation or sustained a fall during device discharge. Routine trauma care and thorough evaluation for polytrauma is necessary.
  - EMS may provide wound care (i.e. cleaning and bandaging the area) for barbs removed prior to their arrival.
  - TASER barb removal is an authorized EMS procedure as per the ROPE guideline included in this document. After EMS evaluation and removal, the patient MUST be transported to an appropriate ED unless law enforcement signs a guardian refusal and assumes responsibility for the patient. EMS providers should not perform a "medical clearance" assessment for law enforcement. Providers should always advocate for the patient's physical health and recommend hospital transport if they feel it is indicated.

- Medical Care:
  - All patients should receive cardiac monitoring and 12-lead EKG assessment. The voltage delivered by an ECD, in combination with toxins/drugs, patient's underlying disease(s), excessive physical exertion and trauma may precipitate arrhythmias.
  - Patient's neurologic status should be assessed and recorded frequently to recognize sudden changes and acute decompensation.
  - Monitoring of the patient must take place until the patient is released to a receiving facility.
  - Pay special attention to signs and symptoms that suggest hyperactive delirium with severe agitation. Patients with hyperactive delirium with severe agitation who are restrained by law enforcement have a heightened risk of mortality in the prehospital setting.

Field Amputation

If a field amputation is needed **contact the Trauma Center** as early as possible to allow for resource mobilization. This includes deployment of a clinician to the scene to perform this procedure.

V. TRAUMA CENTER DESIGNATION[2]

Trauma centers are verified by the American College of Surgeons. The different levels refer to the types of resources available in the trauma center and the number of patients admitted yearly. Within Region 1, University Medical Center is a Level I Trauma Center; Children's Hospital New Orleans is a Level I Pediatric Trauma Center.

Level I

A Level I Trauma Center can provide total care for every aspect of injury – from prevention through rehabilitation. Some of the required elements for Level I Trauma Center verification include:

- 24-hour in-house coverage by general surgeons, and prompt availability of care in specialties such as orthopedic surgery, neurosurgery, anesthesiology, emergency medicine, radiology, critical care, plastic surgery, oral and maxillofacial surgery, internal medicine, and pediatrics.
- Referral resource for communities in nearby regions

Level II

A Level II Trauma Center can initiate definitive care for all injured patients. Some of the required elements for Level II Trauma Center verification include:

- 24-hour immediate coverage by general surgeons, as well as coverage by the specialties of orthopedic surgery, neurosurgery, anesthesiology, emergency medicine, radiology, and critical care.
- Tertiary care needs such as cardiac surgery, hemodialysis and microvascular surgery may be referred to a Level I Trauma Center.

Level III

A Level III Trauma Center has demonstrated the ability to provide prompt assessment, resuscitation, surgery, critical care, and stabilization of injured patients. Some of the required elements for Level III Trauma Center verification include:

- 24-hour immediate coverage by emergency medicine physicians and prompt availability of general surgeons and anesthesiologists.
- Transfer agreements for patients requiring more comprehensive care at a Level I or Level II Trauma Center.

Level IV

A Level IV Trauma Center has demonstrated an ability to provide advanced trauma life support (ATLS) prior to transfer of patients to a higher-level trauma center. It provides evaluation, stabilization, and diagnostic capabilities for injured patients. Some of the required elements for Level IV Trauma Center verification include:

- Basic emergency department facilities to implement ATLS protocols and 24-hour laboratory coverage. Available trauma nurse(s) and physicians available upon patient arrival.
- May provide surgery and critical-care services if available.
- Has developed transfer agreements for patients requiring more comprehensive care at a Level I or Level II Trauma Center.

Level V

A Level V Trauma Center provides initial evaluation, stabilization and diagnostic capabilities and prepares patients for transfer to higher levels of care. Some of the required elements for Level V Trauma Center verification include:

- Basic emergency department facilities to implement ATLS protocols.
- Available trauma nurse(s) and physicians available upon patient arrival.
- After-hours activation protocols if facility is not open 24-hours a day.
- May provide surgery and critical-care services if available.
- Has developed transfer agreements for patients requiring more comprehensive care at a Level I through III Trauma Centers.

When uncertain, transport to the higher level of care is the safest and recommended approach. Medical Control may also be consulted for triage support.

[2] https://www.amtrauma.org/page/traumalevels

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Trauma Center Triage Criteria

The recognition of major trauma and the decision to transport the patient to a designated trauma facility (as determined by this guideline & Medical Control) supersedes patient choice without consideration of patient finances.

Mental status and vital signs

All patients:
- GCS < 14
- RR < 10 or >29 breaths/min
- Room air SPO2 < 90%
- Respiratory distress or need for respiratory support

Age 0-9 years:
- SBP < 70 mmHg + (2 x age years) Age 10-64 years:
- SBP < 90 mmHg
- HR > SBP (+ shock index)

Age > 65 years:
- SBP <110 mmHg
- HR > SBP (+ shock index)

Trauma Center Medical Control **must** be called for every trauma activation and anytime it is unclear whether or not a patient is a candidate for the trauma center

Injury patterns

- Penetrating injury to head, neck, torso, or proximal extremities
- Skull deformity, suspected skull fracture
- Suspected spinal injury with new motor or sensory loss
- Chest wall instability, deformity, or suspected flail chest
- Suspected pelvic fracture
- Suspected fracture of 2 or more proximal long bones
- Crushed, degloved, mangled, or pulseless extremity
- Amputation proximal to wrist or ankle
- Active bleeding requiring a tourniquet or wound packing with continuous pressure
- Head trauma on anticoagulant (excluding ASA) or history of bleeding with evidence of high energy impact

Mechanism of injury

- **High risk auto crash with complaints and moderate injuries:**
- **Partial or complete ejection**
- **Significant intrusion (including roof):**
- **12 inches into occupant site**
- **18 inches into any site**
- **Need for extrication of entrapped patient**
- **Death in same passenger compartment**
- **Child (0-9 years) unrestrained or in unsecured child safety seat**
- **Vehicle telemetry data consistent with severe Injury**
- **Rider separated from transport vehicle with significant impact (i.e. motorcycle, ATV, horse, etc.)**
- **Pedestrian/bicycle/motorcycle rider thrown, run over, or with significant impact (> 20 mph)**
- **Fall from height > 10 feet (any age)**
- **Burns in conjunction with trauma**
- **Blast or explosion**
- **Hanging**
- **High-energy electrical injury**

≥ 15 y/o:
Transport to UMC

≤ 14 y/o:
Transport to CHNOLA
Call Report ASAP

Special considerations

- EMS provider judgment
- Any age pregnancy > 20 weeks meeting trauma center criteria.

Routing criteria

- Children should be triaged preferentially to pediatric capable centers.
- Age 14 and under ➔ Children's Hospital
- Age 15 and older and any age pregnant ➔ University Medical Center

If multiple patients are transported by one clinician, choose a Trauma Center based upon the sickest patient. Use discretion when deciding whether to transport to one versus multiple facilites.

If the patient meets trauma criteria and has one of the below or online **Medical Control** feels it is in the patient's best interest, Medical Control may direct EMS to stop at the closest Emergency Department for patient stabilization.

- Traumatic arrest not meeting criteria for DNR (as per TCA/Withholding of Resuscitation guideline)
- Non-patent airway that cannot be corrected by OPA, BVM, and oxygen
- Tension Pneumothorax
- Transport time > 50 minutes to trauma center

After stabilization at the closest ED, the provider should proceed expeditiously to the highest level Trauma Center if indicated. This stopover does not qualify as a hospital to hospital transfer.

Routine Trauma Care

The following procedures will be utilized on all trauma emergencies requiring Prehospital Trauma Life Support (PHTLS)

- Ensure scene safety and BSI/PPE precautions[1]
- Determine number of patients and need for additional resources
- Determine mechanism of injury

Trauma Center Absolutes

- GCS <14
- SBP <90 mmHg (<110 if > 65yo)
- RR <10 or >29 bpm (<20 if < 1 yo)
- Flail chest
- Penetrating injuries: head, neck, torso, extremities proximal to elbow/knee
- Pelvic fracture
- 2+ proximal long bone fractures
- Crushed, degloved, mangled, or pulseless extremity
- Amputation proximal to wrist or ankle
- Open or depressed skull fracture
- Head trauma with increased risk of bleeding
- Paralysis
- High-energy electrical injury
- Traumatic burns
- Blast or explosion injury
- Hanging
- Falls
  - Adult >20 feet (two stories)
  - Child >10 feet (one story) or >2x child's height
- Motorcycle crash > 20mph
- Motor vehicle collision:
  - Passenger compartment intrusion >12 inches at patient site, >18 inches any site
  - Ejection (partial or complete)
  - Death in same passenger compartment
  - Vehicle telemetry data suggests high risk injury
- Auto v. pedestrian/bicyclist/ATV:
  - Thrown
  - Run over
  - Significant impact (>20mph)

Perform primary survey[2] upon patient contact:

Vital Signs

EKG Monitor (12-Lead as needed)

MARCH if obvious external hemorrhage

Control exsanguinating hemorrhage

- Assess airway patency
- Evaluate mental status for ability to protect airway
- Provide supplemental oxygen as clinically indicated

- Listen bilaterally on lateral chest wall for breath sounds
- Place semi-occlusive dressing on open chest wounds
- Perform needle decompression for tension pneumothorax

- Establish IV/IO Access with 2 large bore IVs[3]
- Saline Lock, Crystalloid, or Whole blood as indicated
- Place pelvic binder if hypotensive and pelvis is unstable
- Consider using **Traumatic Shock** guideline

Consider Spinal Motion Restriction and Pain Management[4] then

Continue treatment under appropriate Trauma guideline

MARCH
Massive hemorrhage
Airway
Respirations
Circulation
Hypothermia

Vital Signs (perform q5min)

Blood Pressure
Heart Rate
Respiratory Rate
SpO2
etCO2
GCS score
Temperature
Pain Scale

[1] Body substance isolation (BSI) and personal protective equipment (PPE): eye protection, face mask, gloves etc.
[2] See Trauma preambles for additional primary survey PEARLS
[3] IO access can replace one large bore IV in unstable patients where peripheral IV access cannot be obtained
[4] According to **Spinal Motion Restriction** and **Traumatic Pain Management** guidelines

Hemorrhage Control

Routine Trauma / Medical Care

Apply direct pressure[1] to the bleeding site

- Minimize/limit release of pressure while examining the wound
- If a discrete bleeding vessel can be identified, point pressure is more effective than diffuse pressure

[1]If life threatening hemorrhage exists, any provider may bypass pressure/dressing and use tourniquet or hemostatic agent immediately

Amputation?

- Gently rinse severed part with sterile saline
- Wrap severed part in moist, saline soaked gauze then place in a sealed plastic bag
- Place bag with severed part on ice in a second bag during transport

Do not freeze severed part

Apply pressure bandage or dressing[1]

Hemorrhage controlled?

Yes → Transport

No

<u>Head, Neck, Torso, or Junctional Injury:</u>

Apply topical hemostatic agent with direct pressure (following manufacturer's instructions)

Consider junctional tourniquet or junctional hemostatic device if available

<u>Extremity Injury</u>

Apply tourniquet(s) +/- deep wound packing

- Cut away clothing prior to application
- Apply "<u>high & tight</u>" in the most accessible proximal position on limb
- Mark "TK" and time of application on tape applied to the tourniquet
- Apply a second tourniquet if bleeding not controlled with one – <u>do not overlap</u>!

- Transport to a Trauma Center and notify receiving ED staff of tourniquet use
- Do not release tourniquet(s) while in route to hospital
- Treat pain as per **Traumatic Pain Management** guideline
- Identify shock early
- Cover Patient - Keep WARM
- Consider TXA and/or blood products (if available) as per **Traumatic Shock** guideline

Contact **Medical Control** for additional orders or consultation

Traumatic Shock

Shock is defined as impaired tissue perfusion and may be manifested by any of the following:

- Altered mental status
- Tachycardia
- Poor skin perfusion
- Low blood pressure

Maintain a high index of suspicion. Traditional signs of shock may be absent early in the process.

Routine Trauma Care

Is patient hypotensive for age or showing other signs of shock?

Hypotension for Age	
Age	Systolic Blood Pressure
> 10 years	< 90 mmHg
1-10 years	< 70 + (2 x age in years)
< 1 year	< 70 mmgHg

Tachycardia for Age	
Age	Heart Rate
> 12 years	> 100 bpm
5-12 years	> 120 bpm
2-5 years	> 140 bpm
1-2 years	> 150 bpm
< 1 year	> 160 bpm

Treat reversible causes of shock (if not done already):

- Control hemorrhage, if not done already
- Perform needle decompression for tension ptx
- Place pelvic binder for suspected unstable fracture

Minimal SBP with Head Injury	
Age	SBP
>10 years	= 110 mmHg
1-10 years	> 70 + (2 x age in years)
1-12 months	>70 mmgHg
< 1 month	> 60 mmHg

If patient is still in shock:

Does patient meet criteria for transfusion of Whole Blood?

Yes

Transfuse Blood Product:

Low Titer O+ Whole Blood (LTOWB)
500 ml (2 units) IV/IO
- or -
Packed Red Blood Cells (pRBCs)
500 ml (2 units) IV/IO
- or -
Fresh Frozen Plasma (FFP)
500 ml (2 units) IV/IO

- **Calcium Chloride** 2g IV/IO
- **Tranexamic Acid (TXA)** 2g IV/IO over 10 min, if available (may give IM as a last resort)

Blood Transfusion should occur while in route to the hospital and should not delay transport

Consider viability of patient prior to committing to Blood use

Contact Trauma Center Medical Control for consultation or additional orders

No

Fluid Resuscitation:

- Give **Crystalloid Fluid** bolus of NS/LR (500 ml for adults, 20ml/kg for peds)
- If patient is still in shock, continue small Crystalloid Fluid boluses of 250 ml (20ml/kg for peds) until the return of peripheral (radial) pulses
- Once pulses are maintained, lock IV and repeat boluses only as needed for SBP <90 mmHg

Blood Inclusion Criteria

1. Blood Product is available
2. **SHOCK** Is due to **HEMORRHAGE**
3. **5** years of age or older -- **ages 5 - 10 = 1 unit / ages 10 above = 2 units**
4. Pt has **no religious objections** to blood products [obtain verbal consent if patient is capable]
5. Pt has **ONE** of the following criteria:

SBP < 70 mmHg
SBP < 90 mmHg with HR ≥ 110 bpm
Age ≥ 65 yo with SBP < 100 mmHg and HR ≥ 110 bpm

*If criteria is not met and the Blood Medic feels blood is indicated, contact on-call Medical Control / Medical Director prior to initiating.

Traumatic Cardiac Arrest (TCA) | Withholding of Resuscitation

Are patient's injuries incompatible with life (any of the following):

- Decapitation
- Incineration
- Body decomposition
- Rigor mortis

(EKG unnecessary)

Yes → Contact Trauma Center Medical Control for DNAR

No

Does patient meet ALL of following criteria:

- Victim of blunt or penetrating trauma
- No spontaneous movement
- No pupillary response
- Apneic and pulseless
- EKG showing asystole or PEA <40 bpm

Yes → Contact Trauma Center Medical Control for DNAR

No

Consider transport of the following even if all DNAR criteria are met:

- Pregnancy > 20 weeks gestation
- Lightning strike/electric shock
- Associated hypothermia < 86°F
- Concern for scene safety/ support

Loss of vital signs > 10 min?

Yes → **Consider** obtaining DNAR from Medical Control

No

Once resuscitation is initiated, patient should be immediately transported to the Trauma Center

resuscitative efforts should not prolong scene time for TCA

Is there a medical cause for patient's arrest?

Yes → Routine Medical Care & Medical or Pediatric Cardiac Arrest Protocol

No

Address Reversible Traumatic Pathologies[1]:

Hypovolemia	• control external hemorrhage • splint pelvis/long bone fractures • IV/IO fluid/blood bolus
Oxygenation	• airway management (BVM, SGA, ETT) • EtCO2 and SpO2 monitoring
Tension ptx	• bilateral needle decompression ****Consider Finger Thoracostomy ONLY Trained personnel with Approval of Medical Director may perform ****

Needle Decompression:
Primary site: 4th or 5th intercostal space of the anterior axillary line
Secondary site: 2nd or 3rd intercostal space of the midclavicular line

Finger Thoracostomy: 4th or 5th intercostal space of the anterior axillary line.
NOTE: ONLY Trained personnel with Approval of Medical Director may perform

[1]Chest compressions should be ideally be performed simultaneously while addressing reversible pathologies; however, if necessary they may be delayed or paused during HOT treatment(s)

Traumatic Pain Management

- Any patient treated under this protocol must be transported to an appropriate emergency department
- Remember that a pain score > 5 could be distracting other injuries
- Head trauma is not a contraindication to pain management
- Hypotension is not a contraindication to pain management – use smaller doses and titrate to effect

Routine Medical Care / Trauma Care

- Evaluate mechanism of injury (MOI)[1]
- Assess the need for spinal precautions per **Spinal Motion Restriction** guideline

Attempt comfort therapies first:
- Place patient in position of comfort
- Splint/support painful areas
- Consider ice and/or compresion

Record level of pain by either asking patient to rate on scale 1-10 or using FACES scale

Have **Naloxone** readily available to treat narcotic-induced respiratory depression.

Administer **one** of the following for moderate to severe (6-10) pain[1]:

(1) **Fentanyl** 25-50mcg IM or slow IV push q2min prn (max 150mcg) or

(2) **Morphine Sulfate** 2-4mg IV/IM q2min prn (max 10mg) or

(3) **Ketamine**[3] 1mg/kg IV/IO slow IV push over 1 min or IV Infusion over 10 min - q15min prn (max 50mg IV/IO)
or
(4) **Ketorolac [Toradol]** 15mg IV/IM ***Do Not Utilize on RENAL Insufficiency or GI Bleed Patients ***

[3]Consider giving Ketamine as first-line therapy for persons who refuse opiates or have a history of opiate use disorder

If nausea/vomiting due to analgesia:
Ondansetron 4 mg IV/IO/PO prn (max 8mg) for nausea/ vomiting with active pain - or -
Droperidol 1.25 mg IV **exclude ages >65yo and <12yo**

If additional analgesia is needed for persistently severe pain (8-10) believed to be due to a surgical pathology
or
If benzodiazepines are needed for a ketamine-induced emergence reaction[2], contact **Medical Control**

[1]Wong-Baker FACES of pain rating scale.
** Score is based on patient's (not provider's) assessment of their pain**

[1] See **Adult Trauma Center Triage** guideline to determine which MOI(s) is most severe and may be distracting
[2] Tonic-clonic movements are common after the administration. They should not be confused with an emergence reaction which usually includes hallucinations, flashbacks, or irrational behavior mixed with periods of lethargy.

Head Injury

Signs of Herniation[1]

- Decreasing mental status
- Abnormal respiratory pattern
- Asymmetric/unreactive pupils
- Cushing's reflex (elevated BP, bradycardia, & irregular breathing/apnea)
- Decorticate posturing (abnormal flexion)
- Decerebrate posturing (extension)

- Routine Trauma Care – including SpO_2, $EtCO_2$, CBG, and neurologic assessment
- Administer **Oxygen** 15L via NRB

Is patient GCS < 8 and/or SpO_2 <90% after 15L of oxygen?

Yes

- Reposition airway via jaw thrust; insert OPA/NPA
- Assist ventilations via BVM
- Limit neck/spine movement as much as possible

No

Does patient have signs of shock or SBP <90?

Yes

- Give **Crystalloid Fluid** bolus 1L IV/IO once
- Proceed to **Traumatic Shock** guideline

No

Perform ETT or insert SGA if SpO_2 remains <90% or GCS<8 persists (see **Airway Management** guideline)

Elevate head of bed to 30° to decrease ICP (this can be done with spinal motion restriction!)

Promote cerebral perfusion

(a) Maintain $EtCO_2$ 35-45 mmHg – avoid even mild hyperventilation!

(b) Avoid and treat hypotension – monitor for a dropping SBP

(c) Restrict IV Fluids if SBP ≥ 140 mmHg

(d) May Give **Midazolam** 2.5 mg IV/IO/IM if patient is combative

Contact Trauma Center **Medical Control** for consultation or additional orders

Target SBP

Adults (10^+ yo): ≥ 110 mmHg

- Trend and document neurologic status during transport to hospital
- Monitor for signs of deterioration or herniation[1]
  - Consider potential for seizures
  - Initiate hyperventilation if s/s of herniation (target $EtCO_2$ 30-35); **Do not hyperventilate for "impending herniation"**

Glasgow Coma Scale

Any aspect of the score that cannot be tested should be noted as *NT* - e.g. GCS = E2, VNT, M4

	1	2	3	4	5	6
Best Eye Opening	None	To Pain/Pressure	To Sound	Spontaneous	-----	-----
Best Verbal Response	None	Incomprehensible Sounds	Inappropriate Words	Confused	Oriented	-----
Best Motor Response	None	Extension	Abnormal Flexion	Withdraws to Pain	Localizes to Pain	Obeys Commands

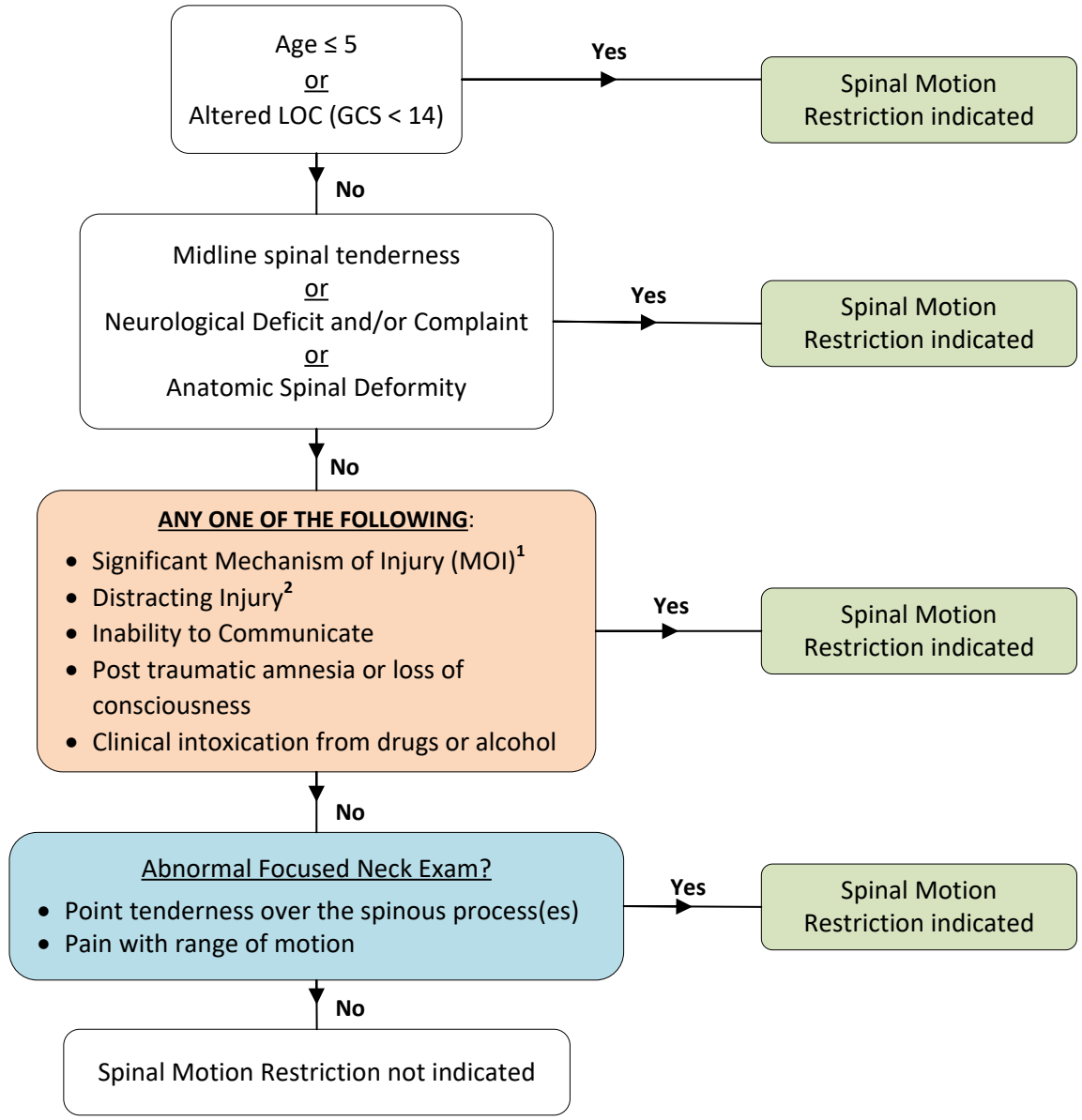
Spinal Motion Restriction (SMR)

This guideline is for blunt trauma only. Penetrating trauma with no evidence of spinal injury does not requires SMR. Always perform Routine Trauma Care first.

The critical component of Spinal Motion Restriction is use of a cervical collar.

The remainder of the head/neck/torso should be kept in alignment with a long spine board, scoop stretcher, Reeves© stretcher, vacuum splint, ambulance cot, or other similar device.

If unsure whether SMR is indicated, always make the determination to protect the patient



- **A long spinal board should be used for extrication only (not transport) unless the clinical situation warrants it.** Examples include an unconscious patient, immobilization of multiple extremity injuries, or providing a firm surface for chest compressions. In these situations, long boards should ideally be padded to minimize patient discomfort and secondary injury from ischemic pressure to the skin. Remove patient from the long board as soon at it is practical.
- **Patients that are ambulatory upon arrival do NOT require full immobilization for transport. They may be secured on the stretcher with cervical collar and straps.**
- **The preferred position for patients with spine management is flat and supine; however, providers may place patient in reverse Trendelenburg or elevate HOB up to 30° if necessary.** Indications for this include but are not limited to (1) respiratory distress, (2) suspected head trauma, and (3) promotion of patient compliance.

[1] Significant MOI: determined by provider's clinical judgement. Examples include, but are not limited to, (a) fall >10ft, (b) high speed MVC/rollover/ejection, (c) bicycle/ATV/motorcycle collision, and (d) axial load injury (ex. diving, helmet-to-helmet contact).

[2] Distracting Injury – "a condition thought by the clinician to be producing pain sufficient to distract a second (neck) injury" or "injuries […] so severely painful that the neck exam is unreliable." Remember, if you are using the **Traumatic Pain Management** guideline, the patient may have a distracting injury.

Open Wound / Fracture / Dislocation

Routine Trauma Care

Evaluate mechanism of injury

- Consider polytrauma – complete primary survey first!
- Consider spinal motion restriction – this is likely a distracting injury

This guideline is intended for use on **stable** patients with an isolated fracture or dislocation

Locate, expose and provide manual stabilization of injury

Control bleeding and assess distal perfusion

- Are distal pulses present?
- Is there capillary refill?
- Is extremity cyanotic (cold & blue)?

Consider, recognize, and treat hemorrhagic shock – especially if pelvis/femur fractures are present

Do not reintroduce exposed bone (i.e. open fractures) back into the skin unless distal circulation is absent

Clean, bandage, and dress any open wound using an aseptic technique

Treat pain

- Follow **Traumatic Pain Management** guideline
- Consider applying cold packs to fracture locations

- **Immobilize pelvis fractures using sheet wrap/papoose method or pelvic binder**
- **Immobilize Hip fracture/dislocations using sheet wrap/ papoose method**

pelvic binders are not intended for hip or femur fractures

- **Immobilize femur fractures with long leg splints (i.e. traction device)**

If distal circulation is absent:

- **Reposition/Reduce the fracture/dislocation** ONCE to attempt to restore circulation
- Repositioning should attempt to achieve normal anatomic position

Immobilize bones by splinting the joints above and below

Immobilize joints by splinting the bones above and below

Immobilize/splint fracture/dislocation

Reassess and record distal circulation after immobilization

Traumatic Rhabdomyolysis / Crush Injury

Crush Injury

- Compression of extremities or other major muscle groups causing muscle swelling and/or neurological impairment.
- Physical findings are similar to the six Ps of compartment syndrome[1]
- Patients may initially present with very few signs & symptoms. Have a high index of suspicion based on MOI.

Crush Syndrome

- Systemic manifestations of crush injury due to traumatic rhabdomyolysis and the release of potentially toxic cell components (ex. myoglobin) and electrolytes (ex. potassium) into the circulation. Early treatment improves survival.
- May lead to altered mental status, hypotension, lethal dysrhythmias, hyperkalemia, hypocalcemia, renal failure, or death.
- More likely with multiple crushed limbs.

[1]Compartment Syndrome Signs & Symptoms:

- Pain
- Paresthesia
- Pallor
- Paralysis
- Pulselessness
- Poikilothermia (cool skin)

Routine Trauma Care including

- Apply cardiac monitor
- Give high flow oxygen

- Provide **Hemorrhage Control** as per guideline
- Consider polytrauma – look for other potential injuries

Remove rings, bracelets, or constricting items

TOURNIQUETS FOR MANAGEMENT OF CRUSH

Tourniquets may delay the life-threating complications of a reperfusion injury.

Consider tourniquet placement for crush injury before extrication if the length of entrapment exceeds 2 hours

Apply two tourniquets side by side and proximal to the injury immediately before extrication.

- Obtain EKG
- Establish 2 large bore IVs (may insert IO in unaffected limbs)
- Give **NaCl bolus** 1L IV/IO with 50mEq of **Sodium Bicarbonate** added per liter of NaCl[1]
- Following bolus, give **NaCl infusion** IV/IO at a rate of 1L/hour
- Provide **Traumatic Pain Management** as per guideline

[1]**Avoid Lactated Ringers** - it contains potassium!

PEARL

Traumatic rhabdomyolysis is secondary to a mechanical force injury such as a crush injury or prolonged immobilization.

Nontraumatic rhabdomyolysis may be secondary to exertional causes such as seizures or non- exertional causes such as electrolyte abnormalities.

Monitor for hyperkalemia:

- peaked T waves
- flattened P waves
- prolonged PR interval (>0.2 sec)
- widened QRS (>0.12 sec)
- sine wave
- ventricular fibrillation

If signs of hyperkalemia are present on EKG:

- **Calcium Chloride** 1gm IV/IO over 5 minutes (do not exceed 1ml/min)
- Bolus **Sodium Bicarbonate** 100mEq IV/IO
- **Albuterol Sulfate** 20mg nebulized

Contact **Medical Control** for further orders or consultation

[1] Monitor the patient closely during extrication. Administer IV fluid before releasing the crushed part. Start with NaCl bolus without sodium bicarbonate if preparing the solution will delay initiation of treatment.

- Patients frequently develop hyperkalemia and shock soon after the external pressure is released. Rapid clinical deterioration is expected. Repeat EKGs frequently.
- Monitor the air quality for confined space rescue.

Burn Care

SCENE SAFETY & PROVIDER SAFETY SHOULD ALWAYS BE THE PRIORITY

- Only life saving interventions should be performed prior to decontamination and should always be done after applying PPE
- Decontamination can include (a) removing clothing from the patient, (b) brushing off powder/crystal residue, (c) flushing the burn(s) with normal saline or lukewarm tap or bottled water. **Do NOT flush patients in the ambulance.**
- Involve local fire department to assist with on-site patient irrigation/decontamination as necessary prior to patient transport

[1] **Signs of 2nd/3rd Degree Burns:**

- Blisters, bullae
- Sloughing skin
- Skin with brown/white leathery appearance (aka eschar)

Measuring Burned BSA:

- Palmar surface of patient's hand = 1% BSA
- Assume BSA > 20% if burn is large and you're unsure

Routine Trauma Care including IV/IO access (place through burned skin as last resort)

Obtain 12-lead EKG if suspicion of electrical burn

Is there concern for upper airway injury?

- Stridor, hoarseness, cough
- Soot-tinged sputum, singed hairs
- Extensive facial/mouth burns
- Circumferential neck burns
- Respiratory distress

Yes

- 100% O^2 via NRB
- Elevate head of bed >30°
- Prepare for aggressive airway management

No

Greater than >10% BSA with **2nd/3rd** degree burns?[1]

No

- Cover with dry, clean sheet/blanket or sterile dressing
- Give **Crystalloid Fluid** IV infusion at 125ml/hr

Yes

- Give **Crystalloid Fluid** IV/IO infusion based on age:
  - 13+ years: 500 ml/hr
  - 6-12 years: 250 ml/hr
  - 0-5 years: 125 ml/hr
- Cover with dry, clean sheet/ blanket or sterile dressing

If patient is altered:

Consider causes of neurologic impairment

- Hypoxemia
- CO or CN inhalation (see **HAZMAT** guideline)
- Opiate overdose
- Pre-existing condition (ex. MI, DM)

- Provide **Traumatic Pain Management** as per guideline
- Remove restrictive clothing and jewelry (remove contact lenses if possible ocular injury is present)
- Check/document distal pulses below circumferential or electrical burns – compartment syndrome may develop
- Determine if transport to an ED with decontamination setup is needed – alert hospital in advance; do not enter the hospital until you are sure it is safe

Contact **Medical Control** for additional orders or consultation

Refer to Burn Center Triage Guideline for further information

Burn Center Triage Criteria

Prehospital fluid resuscitation requirements

Lactated Ringers preferred Initial resuscitation:

- ≤ 5 y/o: 125 ml/hr
- 6-12 y/o: 250 ml/hr
- ≥ 13 y/o: 500 ml/hr

If > 1 hour transport time = **Adjusted fluid rates**

Flame or scald injuries

- ≥ 13 y/o: (2 ml x kg x % TBSA)/16 = ml/hr
- ≤ 12 y/o: (3 ml x kg x % TBSA)/16 = ml/hr

Electrical Injuries

All ages: (4 ml x kg x % TBSA)/16 = ml/hr

Burn Injury Patterns

- 2nd/3rd degree burns involving > 10% body surface area
- All 3rd degree burns
- Burns involving face, hands, feet, genitalia, perineum, or major joints
- Circumferential injury
- Chemical burns
- Electrical burns, including lightning injury
- Inhalation injury
- Burns associated with trauma
- Ocular burn injury
- Radiation burns
- Blast injuries

Special considerations

- EMS provider judgment

Clinical Pearls

Divert to the nearest ED for stabilization if:

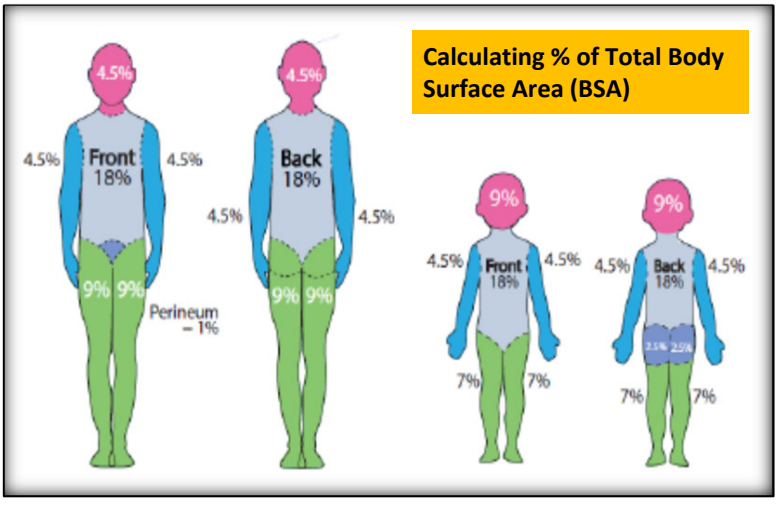
- Unable to obtain a definitive airway in patient with imminent airway compromise
- Unable to obtain IV/IO access in patient with 2nd/ 3rd degree burns > 40% BSA
- If diversion is necessary, the provider should proceed to the Burn Center as soon as the patient is stabilized. ***Note: This stopover does not qualify as a hospital-to-hospital transfer***

- Do NOT include 1st degree areas in the TBSA calculation (superficial burns without blister formation, eg. sunburn)
- The size of the patient's hand – including the fingers – represents one percent (1%) of his/her total BSA

Routing criteria

- Children should be triaged preferentially to pediatric capable centers.
- Age 14 and under ➔ Children's Hospital
- Age 15 and older and any age pregnant ➔ University Medical Center

Trauma Center Medical Control should be contacted for every major burn patient and when it is not clear whether patient is a Burn Center candidate



TASER Barb Injury

If you are using this guideline you should also evaluate for Hyperactive delirium with severe agitation **see corresponding guideline as well as Trauma Preambles**

Ensure scene safety
Confirm barb cartridge is disconnected from device (do not cut wire unless authorized by Law Enforcement)

Consider polytrauma from physical confrontation or from a fall after the TASER shock

Routine Medical Care / Routine Trauma Care including
- VS (BP, HR, RR, SpO2, Temp, GCS)
- Cardiac monitoring & 12 lead EKG
- Capillary Blood Glucose

Documentation on ALL patients should include:

(1) History of incident
- why TASER was used
- type of shock delivered (probe vs. direct stun, # of cartridges, duration of shock)
- patient's mental status before and after to TASER use

(2) Restraining positions used by Police and/or EMS

(3) Location of all barbs and who removed them (Police or EMS)

Altered mental status or agitation present? **Yes** → Treat according to **Altered Mental Status** or **Hyperactive delirium with severe agitation** guideline

No

Arrhythmia, chest pain, palpitations, or dyspnea present? **Yes** → Treat according to appropriate **Cardiac** or **Medical** guideline

No

Does patient require transport?
(If any of the following are yes)
- Persistently abnormal vital signs
- Hyperthermia >104°F
- Altered mental status or Hyperactive delirium with severe agitation
- Complaints of chest pain, shortness of breath, palpitations or headache
- History of coronary artery disease
- History or exam findings to suggest recent amphetamine or hallucinogenic drug use
- TASER barb located in sensitive area (head, neck, hands, feet, groin, female breast)
- Patient requests transport to the hospital

Yes

Leave TASER barb(s) in place

- Transport patient on cardiac monitor
- Perform frequent cardiac, vascular, and neurologic reassessments during transport
- Document initial and repeat assessments performed

No

- Remove TASER barb(s) according to policy/ procedure
- Handle probe as a contaminated sharp unless required to return to Law Enforcement for evidence
- Provide first aid and local wound care

Does patient still refuse transport or is patient being taken into custody?

Yes
- Advise patient to monitor for signs of infection (fever, redness, swelling, discharge, localized pain or warmth)
- Advise patient to obtain tetanus vaccination within 72 hours if they have not in the last five years
- Obtain AMA

No
- Transport patient on cardiac monitor, ETCO2 if pt allows
- Perform frequent cardiac, vascular, and neurologic reassessments during transport
- Document initial and repeat assessments performed

EMS providers responding to a TASER'ed patient should not perform a "medical clearance" exam for Law Enforcement

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Region One Protocol Effort

Pediatric Guidelines

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Pediatric Preambles

The American Heart Association's recommended age group classifications for pediatrics will be adopted for use within these guidelines.

- an infant is less than one year of age.
- a child is one year of age to an adolescent (known by secondary sex characteristics; ~12-14 years of age)

Approximately half of the EMS responses to calls for pediatric patients are for injury. Calls for medical complaints outnumber traumatic calls in patients under 5 years. Seizures and respiratory distress are common pediatric medical complaints. Most pediatric cardiac arrests are triggered by respiratory failure. Early recognition and aggressive treatment of respiratory distress, as well as shock, is priority in the treatment of pediatric patients.

I. SHOCK

Heart rate, initially and on repeated assessments, is the key parameter for recognition of compensated shock. Tachycardia without fever, anxiety, or hypoxia requires immediate intervention. Heart rate varies with age, and knowledge of normal vital signs is needed (see table below).

Many clinicians equate shock with hypotension, which may be useful for adults, but this presents problems when caring for children. Normal blood pressure varies with age (see table below) and obtaining an accurate blood pressure in a child can be difficult. Due to children's unique physiology, when hypotension is present, the body's compensatory mechanisms have already failed, and clinicians should recognize that the child is in critical condition and at significant risk of death. While compensated shock may persist for hours, once the patient is hypotensive, cardiopulmonary failure may occur within only minutes.

A change in the level of consciousness demonstrates the effects of shock on the brain. Although this may be subtle, in children as young as 2 months, irritability or failure to recognize one's parents is a sign of cerebral hypoperfusion. A decreasing level of consciousness is an ominous sign. Other parameters to assess shock include muscle tone and pupillary responses.

Common Signs of Shock:

- cool extremities
- pale or mottled skin
- diaphoresis
- altered mental status
- weak peripheral pulses
- prolonged/delayed capillary refill

Treatment goals of shock include:

1) maintaining/restoring adequate oxygenation
2) perfusion to organs and tissues.

Oxygen should be placed empirically, with knowledge of the patient's baseline oxygen saturations.

Restoring adequate intravascular volume by the administration of 20 mL/kg of a crystalloid (Lactated Ringers is preferred) should be initiated quickly (over 5-20 minutes). A resuscitation weight-estimation tool should be

used for fluids, drug dosing, and equipment size. Patients in shock may require up to 60 mL/kg of crystalloid fluid resuscitation.

- If cardiogenic shock is suspected, smaller fluid boluses of 5-10 mL/kg should be used (see Cardiogenic Shock below).
- In diabetic ketoacidosis with compensated shock, a bolus of 10-20 mL/kg should be administered over one hour.

If the patient's condition worsens during fluid resuscitation, such as pulmonary edema, worsening tissue perfusion or development of hepatomegaly, parenteral fluids should be stopped, and an epinephrine drip should be started.

Additional interventions for treatment of shock include:

- cardiac monitoring
- pulse oximetry
- end-tidal CO_2 monitoring
- blood glucose check

Once adequate fluid resuscitation has occurred, if shock is still present, vasopressors, such as norepinephrine or epinephrine, should be considered.

A major difficulty with pediatric patients in shock may be the ability to establish intravenous access. Limiting the number of attempts or time allowed for intravenous access before intraosseous cannulation (in the appropriate patient) is recommended when treating shock. **For septic shock, placement of intraosseous device after two failed intravenous catheter attempts is recommended.**

There are underlying disease processes that can effect a child's baseline oxygen saturation much like COPD in adults such as cardiac lesions. Before administering any supplemental O2 care should be taken to ask caregivers if child has any pervious medical history that has required the tracking of the child's oxygen saturation and obtain their baseline.

In Assessing vital signs, capillary refill – in conjunction with another assessment tool – is an adequate indicator of perfusion. The formula used to approximate blood pressure remains the same, and should be used for recognizing hypotension:

70 +(2 x age in years)

When fluid is needed, 20 ml/kg should be administered (10ml/kg for patients with cardiogenic shock -see below). This can be repeated two more times for a total of 60 ml/kg (30 mg/kg for cardiogenic shock); isotonic fluids only. When treating patients for shock, a fluid bolus of 20 ml/kg (10 ml/kg for neonate) should be given even if the patient has a normal blood pressure.

Pediatric patients are able to compensate prior to showing signs of poor perfusion. Children in shock may initially be present with only tachycardia.

Types of Shock

Septic shock: This is the most common cause of shock and is due to systemic infection. Patients in septic shock generally present with fever and tachycardia. Signs of poor perfusion are not always present. Patients with septic shock require 20/kg of isotonic fluids and can receive up to 3 fluid boluses in the field. Rapid administration of IV fluids is imperative in the treatment of septic shock. Early antibiotic administration is important - notifying the receiving hospital early will help them prepare the antibiotics in advance of the patients' arrival. Patients with underlying medical conditions are at much higher risk of developing septic shock; therefore, anyone with the following medical conditions who has fever and tachycardia should be treated for septic shock with fluids:

- Severe Developmental Delay
- Sickle Cell Disease or Asplenia
- Cancer
- History of Transplant
- Indwelling Line or Catheter
- Immune Deficiency/compromise/suppression

PALS Adjusted Vital Signs for Septic Shock

Age	Heart Rate	Resp Rate	Systolic BP	Temp (°F)
0d - 1m	> 205	> 60	< 60	<96.8 or >100.4
> 1m - 3m	> 205	> 60	< 70	<96.8 or >100.4
> 3m - 1y	> 190	> 60	< 70	<96.8 or >101.3
> 1y - 2y	> 190	> 40	< 70 + (age in yr x 2)	<96.8 or >101.3
> 2y - 4y	> 140	> 40	< 70 + (age in yr x 2)	<96.8 or >101.3
> 4y - 6y	> 140	> 34	< 70 + (age in yr x 2)	<96.8 or >101.3
> 6y - 10y	> 140	> 30	< 70 + (age in yr x 2)	<96.8 or >101.3
> 10y - 13y	> 100	> 30	< 90	<96.8 or >101.3
> 13y	> 100	> 16	< 90	<96.8 or >101.3

Anaphylactic shock: this is a distributive shock caused by histamine release and is a life-threatening allergic reaction. All the blood vessels dilate which causes decreased perfusion and hypotension. This is treated with epinephrine 1:1000 IM up to two times and isotonic fluid boluses of 20 ml/kg up to 2 times (max 40 ml/kg).

Cardiogenic shock: This is primarily a pump problem. The heart is weak and cannot pump blood to all the organs - this results in increased heart rate and eventually poor perfusion and fluid overload. Signs of cardiogenic shock include weak pulses, hepatomegaly, and crackles on lung exam. Cardiogenic shock still requires fluid but should be treated with 5-10 ml/kg isotonic fluid boluses (max of 500 ml) isotonic fluid boluses.

Patients with cardiogenic shock will get worse if they receive too much fluid too quickly. If there are any signs of fluid overload, consider starting an epinephrine drip. Signs of cardiogenic shock are similar to signs of septic

shock and sometimes it is difficult to differentiate between the two. **Any patient with signs of shock who gets worse after fluids should receive an epinephrine drip.** Call Medical Control if needed to ask for help with managing patients with cardiogenic shock and notify the hospital well in advance of the patient's arrival.

II. AIRWAY/VENTILATION

Overview:

Proper oxygenation is key in the management of critical pediatric patients. When done correctly, simply addressing oxygenation/ventilation issues, even with BLS interventions, often leads to rapid improvement in these patients. Proficiency in pediatric bag-valve-mask ventilation is mandatory for all prehospital clinicians. Model EMS clinical guidelines recommend escalating from the least to most invasive intervention. When supplemental oxygen via nasal cannula, simple mask or non-rebreather mask do not maintain adequate oxygenation, assisted ventilation and airway management then become necessary. Complete airway occlusion with foreign body removal does require visualization with direct laryngoscopy and removal with Magill forceps.

The method of airway support used in the system should be based on the skill level of the clinicians, equipment and medications available, ongoing training and experience, and transport times. The risks of an advance airway may outweigh the benefits for non-critical care trained paramedic pediatric intubation given the very low frequency of occurrence, the high rates of complications, the increased mortality, no demonstrable benefit to good neurological outcomes in cardiac arrest and trauma, along with the questionable necessity in seizures, The 2019 American Heart Association/International Liaison Committee on Resuscitation update included that bag-valve-mask is sufficient for airway management in children during cardiac arrest in the prehospital setting.

Airway selection/placement:

When selecting oral airways make certain the correct size is being used. Oral airways that are too small will not keep the tongue from occluding the airway; if they are too large it can obstruct the airway.

There is a much higher rate of missed pediatric intubations than adult intubations in the prehospital setting. As a general rule, consider continuing with BVM if you can ventilate effectively. There are a variety of pediatric supraglottic airways available in pediatric and neonatal sizes. **Compared to endotracheal intubation, supraglottic airways have higher first pass success rates and are much quicker to place in the prehospital environment for both pediatric and adult populations**. Current prehospital literature does not show improved cardiac arrest outcomes with pediatric supraglottic airway use, and in fact bag-valve-mask was associated with a higher survival to hospital discharge compared to endotracheal intubation and supraglottic airway. Strict quality improvement programs and research are needed with pediatric supraglottic airway use to monitor efficacy and safety in the prehospital setting.

If pediatric ET intubation is attempted, the size of the ETT is determined by the following formulas:

Uncuffed: patient's (age in years / 4) + 4 = ETT size in mm

Cuffed: (patient age in years / 4) + 3 = ETT size in mm

It is very important that the ETT is properly sized to ensure minimal air leaking and maximal airway protection; therefore, if the tube is too small you should consider using a larger one provided it is a prudent choice to do so using sound clinical judgment. Cuffed endotracheal tubes are preferred in pediatric patients.

Confirmation of ETT placement is accomplished using the same methods in adult ETT confirmation. Capnography (electronic $EtCO_2$ monitoring) is the "gold standard" of airway placement confirmation, monitoring, & documentation. If unable to confirm tube placement by continuous $EtCO_2$ measurements, or if at **ANY TIME** it is thought that the ET tube is misplaced, it should be **immediately removed, and alternate means should be used to control the airway** (i.e. BVM).

Any intubation can stimulate the vagus nerve causing hypotension and bradycardia. Due to pediatric anatomy the vagus nerve is more easily stimulated. Because of this pre-intubation Atropine should be considered for all pediatric ETT placement at 0.02mg/kg to avoid these adverse effects.

For post intubation hypoxia: Troubleshoot the ETT with the **DOPE** mnemonic.

Displacement: Check to see if the tube has been pushed in too far or if it has come out. Look with the laryngoscope to check that the tube is in the trachea.
Obstruction: Suction the ETT.
Pneumothorax: Listen for breath sounds
Equipment: Check the equipment to make sure that everything is connected properly. Check the oxygen to make sure that the oxygen is on, and the tubing is connected properly.

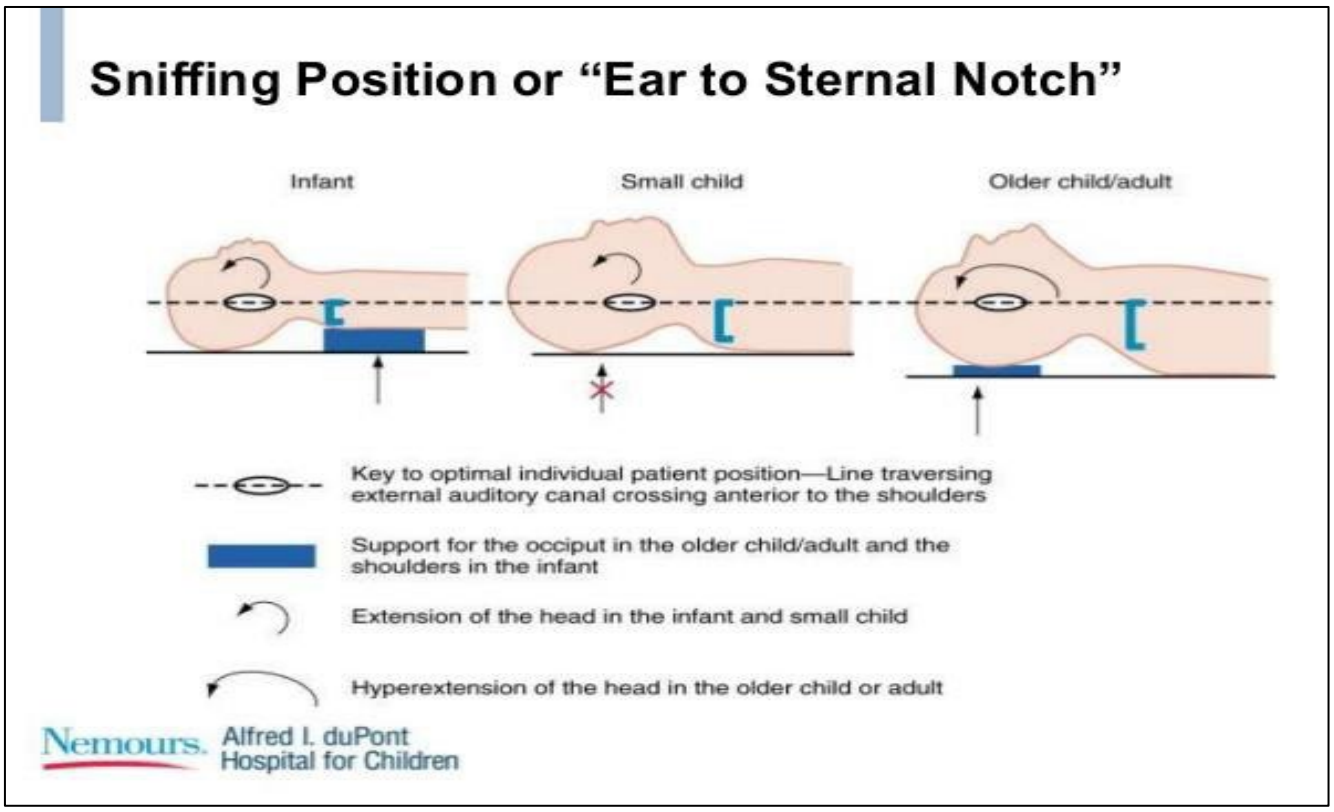
If you believe that the tube is in the trachea but are unable to ventilate, consider suctioning the tube briefly to remove any obstruction and then attempting to give a few breaths before making the decision to remove the ETT. $EtCO_2$ monitors may give low readings for the first few minutes in a cardiac arrest, but as CPR increases circulation and cellular perfusion, $EtCO_2$ values should increase in a patient with a viable downtime. The presence of any $EtCO_2$ value and/or waveform gives evidence of airway confirmation. **NOTE: $EtCO_2$ also often gives the first indicator of ROSC, as evidenced by an abrupt and sustained rise in $EtCO_2$.** The ideal placement of the tip of the ETT is above the carina and below the clavicle. This space is very small for infants and children. A useful formula for ETT depth = 3 x the size of the ETT in the child (i.e. tape a 4.0 ETT at around 12 cm depth). The ETT can easily become displaced. Please be mindful of this and check the position of the tube frequently.

In cardiac arrest, patients tend to be over ventilated which can have paradoxical effects. Ventilating with excessive tidal volume increases intrathoracic pressure and reduces venous return, which reduces cardiac

output, and can also cause barotrauma. Excessive minute volume or ventilatory rate will also decrease cerebral blood flow and coronary perfusion, thereby working against resuscitative efforts. Proper ventilation with controlled peak inspiratory pressure will also keep GI distension to a minimum, which will also reduce the risk of aspiration. Pediatric assessment tape (e.g. Broselow) is recommended to assist with proper tidal volumes & ventilatory rates. Continuous pulse-oximetry and capnography to ensure oxygenation and ventilation are key.

Positioning/Suctioning:

Children have larger occiputs which can cause neck flexion and airway occlusion. Proper sniffing position, with the sternal angle aligning with the external auditory meatus, can be obtained with a chin lift and, when supine, a towel roll beneath the shoulders (see image below. The proportionately larger tongue and adenoids can cause airway obstruction, especially in the supine apneic child. Lateral recumbent positioning, chin lift and jaw thrust, and adjunct (nasopharyngeal or oral) airway devices are potential solutions to this problem. Because children under 6 months of age are obligate nose breathers, nasal suctioning is key to a patent airway in patients who have occluded nares.



Suctioning is a necessary skill in airway protection, but keep in mind that it works against oxygenation efforts and can cause damage if the catheter comes in contact with tissue. Therefore, if suctioning is needed, the duration of suction efforts should be limited, and a max suction force should be between 80 and 100 mm Hg.

Respiratory Distress/Failure:

All children with respiratory distress should have pulse oximetry and capnometry/capnography used as adjuncts

to other forms of respiratory monitoring. Supplemental oxygen should be provided, escalating from nasal cannula to simple face mask to a non-rebreather mask as needed, with the cardiac patient being a special caveat. Known cardiac patients should be kept at their baseline oxygen saturation level. Suctioning can be a very effective intervention to relieve distress.

Signs for upper airway respiratory distress include:

- stridor
- suprasternal retractions
- nasal flaring
- neck muscle use
- respiratory rate greater than normal for age

Signs for lower airway respiratory distress include:

- wheezing
- intercostal, subcostal, supraclavicular retractions
- head bobbing, grunting
- abdominal muscle use
- respiratory rate greater than normal for age
- sleepy, intermittently combative, or agitated

Signs of respiratory failure include:

- central cyanosis / poor peripheral perfusion
- decreased muscle tone
- increased respiratory effort visible at sternal notch
- marked use of accessory muscles
- marked tachycardia

Respiratory failure involves the findings of respiratory failure with any one of the following:

- absent breath sounds
- absent or shallow chest wall motion
- respiratory rate < 10 breaths per minute
- apnea
- limp muscle tone
- unresponsive to voice or touch
- bradycardia
- weak or absent pulses / asystole

Evaluation of children and interventions delivered may be accomplished more easily with the parent's assistance. Moving a child from a position of comfort might worsen the respiratory distress; however, during transport, a child in respiratory distress should be safely restrained in an upright position, unless specific treatments require the supine position.

III. BRIEF RESOLVED UNEXPLAINED EVENTS (BRUE)

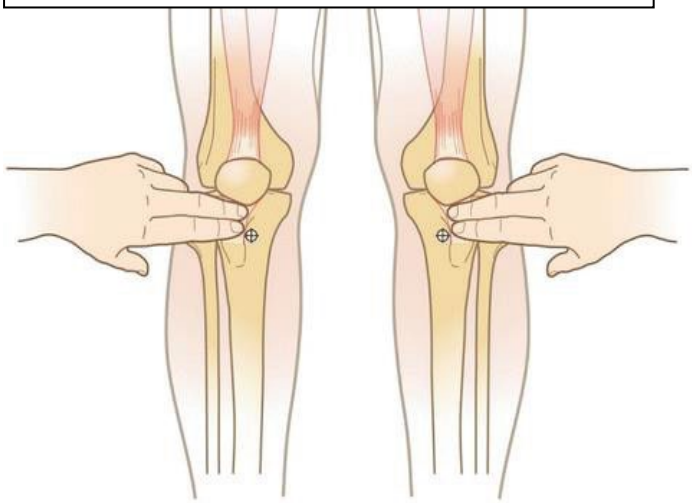
Any patient less than 1 year who has a brief resolved event that resulted in any period of apnea, altered or inadequate breathing, cyanosis, marked change in tone or mental status, or any episode that required bystander CPR should be transported even if they are well appearing on the scene. If another process is identified on exam, follow that guideline. If the parents refuse transport, please call Medical Control to discuss patient refusal against medical advice.

IV. VASCULAR ACCESS

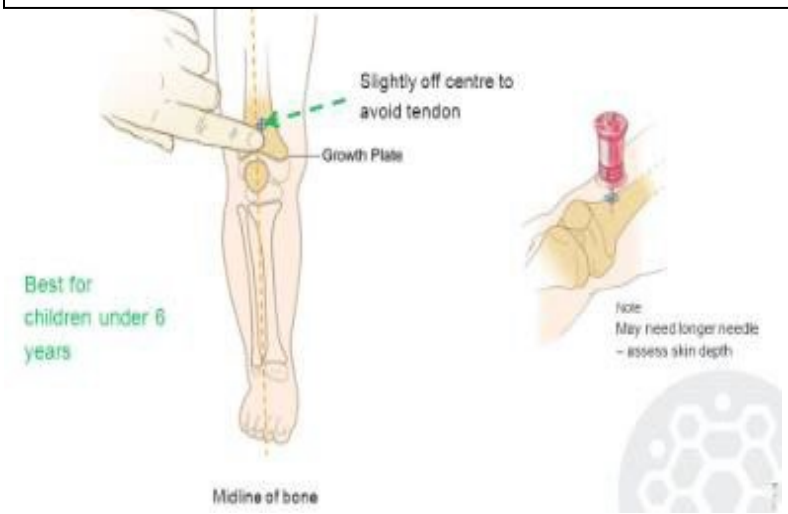
Intraosseous access is just as effective as IV access in pediatrics. IO access should be obtained early for unstable and/or symptomatic children. Therefore, it is unacceptable to take multiple IV attempts in a critical pediatric patient. In cardiac arrests, intraosseous (IO) access is preferred. The preferred IO site for an unconscious pediatric

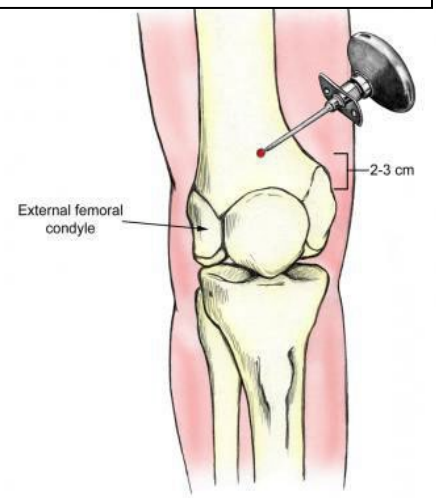
patient or for a pediatric arrest is the distal femur. Only the 25mm (blue) or 45mm (yellow) needles may be used in the distal femur. For the conscious infant or child, a proximal tibial IO may be placed. The smallest IO needle (15 mm – pink) should only be used in those weighing less than 3 kg for a tibial IO. The 25 mm (blue) needle should be used for those requiring a tibial IO who weigh more than 3 kg.

Proximal Tibia IO Placement



Distal Femur IO Placement





V. PEDIATRIC CARDIAC ARREST

The focus is to be placed on immediate, effective, continuous, and minimally interrupted chest compressions in both adult and pediatric cardiac arrest. Even with the likelihood of a respiratory origin of arrest in the pediatric patient, compressions are to be started immediately as there is virtually no set-up time - even basic airway equipment requires some set-up time for sizing and deployment. Therefore, the first cycle of chest compressions should be initiated without delay, while allowing time (approx. 18 sec. for first cycle) for basic airway equipment set-up/sizing.

Chest compressions should be performed at a rate of **100-120 per minute.** To achieve effective chest

compressions, compress at least one third of the anteroposterior diameter of the chest. This corresponds to approximately 1½ inches (about 4 cm) in most infants and about 2 inches (5 cm) in most children. Once children have reached puberty (adolescents), the recommended adult compression depth of at least 2 inches (5 cm) but no greater than 2.4 inches (6 cm) is used. Before the next compression is delivered the chest must fully recoil from the previous compression.

Continue chest compressions while the defibrillator is charging. Pause compressions just before the shock is delivered to ensure the best chance of conversion.

NOTE: The chest compression/ventilation ratio for the neonate is 3:1 to increase focus on ventilation rate, unless there is evidence of a cardiac origin where the ratio reverts back to 15:2. If an advanced airway is present, the chest compressions should be continuous, and breaths should be given every 2-3 seconds.

In symptomatic (unstable) bradycardia for children eight years of age or younger, chest compressions should start when the heart rate is less than 60 beats per minute.

Neonatal Cardiac Arrest:

Any newborn resuscitation differs from infant CPR in that its purpose is predominately to assist the newborn in adjusting to life outside of the uterus (ie focus on warming, stimulation, oxygenation). CPR should be initiated if HR < 60/minute. The guidelines of CPR for the newborn are as follows:

- **Rate of compressions**: 120/minute
- **Depth of compressions**: 0.5”-0.75”
- **Compression to ventilation ratio**: 3:1
- **# of rescuers:** 2+
- **Target HR:** 80/minute
- If no ROSC (HR remains <60) is achieved after 2 minutes of compressions and ventilatory support Epinephrine 0.1-0.3mg/kg of 1:10,000 may be administered IV/IO

These calls can be extremely stressful and taxing on the crew. If there is any uncertainty about how to proceed with these delicate patients contact medical control.

Neonatal cardiac arrests are rare and present a unique set of issues for the pre-hospital provider as workability is largely based on gestational age. Generally speaking a fetus is not viable until at least 20 weeks, however, there is no way to definitively determine in the field the exact gestational age of a fetus. Estimated gestation in the field should allow for a 4-week buffer to gestation provided by the mother. As a rule of thumb if a patient has signs compatible with life resuscitation should be initiated with immediate transport to a Level 3 or 4 NICU. (See table below for NICU levels). Signs of life include:

- visible heartbeat and/or palpable pulse

- spontaneous breathing, crying, gasping
- spontaneous limb movement
- pulsation of cord following clamping
- signs must be sustained for >1 min following birth

Any neonates requiring ventilation whose airway is too small for the 2.5mm ETT will not be a candidate for any NICU. Per the American Academy of Pediatrics Neonate Resuscitation Program, neonates younger than 23 weeks are not generally candidates for resuscitation as their anatomy is normally too small to accommodate. If there is any doubt about the gestational age do not delay resuscitative efforts. Providers may call Medical Control to request termination of resuscitative efforts after they have started resuscitating a newly born patient and then determined that the fetus was less than 20-week gestation. **If the mother did not have prenatal care or is not able to give a history, continue resuscitative efforts and transport the patient.**

These cardiac arrests are like traumatic arrests in that what the patient really requires are the tools and knowledge of specialized care at the correct hospital. In the pre-hospital setting all we can do is give these patients the best chance of reaching that care through emergency management to the best of our ability. During neonatal resuscitation, keep it simple. Focus on warming, drying, and oxygenating the patient like any other birth. We do not currently have the size of tools necessary for neonate resuscitation in the field. Because of this **ventilatory support should be focused on achieving a good seal not attempting to intubate.** The initial steps of resuscitation are:

1. Provide warmth by placing the infant under a radiant heat source / warm environment
2. Position the head in a 'sniffing' position to open the airway
3. Clear the airway with a bulb syringe or suction catheter
4. Dry the infant and stimulate breathing.
5. Evaluate the neonate for respiration, heart rate and color at every 30-second interval

Hospital	NICU LEVEL
Ochsner Baptist	IV
Children's Hospital	IV
Ochsner Main	IV
Ochsner West Bank	III
Touro Infirmary	III
Ochsner North Shore	III
Slidell Memorial Hospital	III
Tulane Lakeside	III
West Jefferson Hospital	III
Ochsner Kenner	II
East Jefferson Hospital	II

Levels	Qualifications
Level IV	Any neonate w/ complex health issues able to fit available equipment
Level III - surgical	< 32 weeks and/or seriously ill requiring further medical/surgical specialists
Level III	< 32 weeks and/or seriously ill . Neonate trained technicians and Cardiac Specialists available

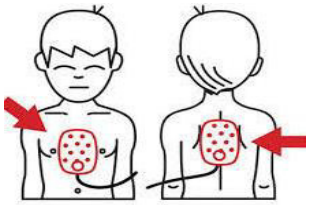
Post Cardiac Arrest Care

After return of spontaneous circulation (ROSC) continue cardiac monitoring, pulse oximetry, and quantitative capnometry; also obtain a blood pressure, electrocardiogram, and blood glucose. Outcomes are worse when hypotension or hypoglycemia are present post cardiac arrest – both should be treated rapidly or avoided.

Oxygenation and ventilation should be optimized. Patients should have a goal oxygen of 94-99% (or as appropriate for patient's underlying condition), with avoidance of hypoxia and weaning of oxygen when oxygen saturations are 100%. Clinicians should target CO_2 appropriate to patient's condition with avoidance of hyper- and hypocapnia.

The 2019 guidelines for post-arrest shock include identifying and treating the "H's and T's" that may be contributing to persistent shock, considering a 20 ml/kg intravenous or intraosseous bolus of isotonic crystalloid (10 ml/kg if poor cardiac function is suspected), and considering the need for inotropic and/or vasopressor support for fluid refractory shock. Cardiac arrhythmias may occur post-cardiac arrest and patients should be closely monitored with any arrhythmias promptly treated.

Defibrillator / Cardioversion Settings



Adult defib pads are generally used on all pediatric patients > 10 kg. However, refer to your device's guidelines.

Defibrillator pad placement – The proper location to attach pads on a child is the anterior-posterior (or "front-and-back") position – one electrode pad is placed in the center of the child's chest and the other pad is placed in the center of their back. Ensure that the pads are not touching or overlapping.

Energy Settings

- In V-Fib / Pulseless V-Tach, the first defibrillation should be given with 2 J/kg; the second shock should be given at 4 J/kg, escalating to a maximum of 10J/kg in refractory V-fib. Stacked shocks should not be given.
- After the 2nd shock, Epi 1:10,000 0.01mg/kg q 3-5 min
- For refractory VF/VT, give Amiodarone 5 mg/kg after the 3rd shock.

Transcutaneous Pacing (this is rarely needed in pediatric patients)

- Use pediatric pacing pads for those patients less than 15 kg.
- Start at a rate of 80-100 for pediatric patients.
- Start at 50 mAmps and titrate up until you obtain capture (usual range 50-100 mAmps, some patients may need higher)

VI. PEDIATRIC TERMINATION OF RESUSCITATION

Pediatric out of hospital cardiac arrest (OHCA) is rare and is associated with poor outcomes. Since the recent advancements in pediatric emergency medicine the survival rate has increased from 2-6% to 17-40%. Of those that survive, only 1-4% have good neurologic outcomes at this point.

Pediatric OHCA is harder on families and on paramedics than OHCA in other patients. Because of this, there are different termination of resuscitation guidelines for children than for adults.

Our guiding principle is to "first do no harm". While it is recommended to attempt resuscitation for all pediatric patients, there are times when resuscitation of a child that has no hope of survival can be more traumatic for the family and EMS providers.

Below are some cases when providers may consider termination of resuscitation for a pediatric patient, however resuscitation may continue at the provider's discretion:

- The withholding of resuscitative efforts should be considered in pediatric victims of penetrating or blunt trauma with injuries obviously incompatible with life, such as decapitation.

- The withholding of resuscitative efforts should be considered in pediatric victims of penetrating or blunt trauma with evidence of a significant time lapse following pulselessness, including dependent lividity, rigor mortis, and decomposition.

- The withholding of resuscitative efforts should be considered in newly born patients less than 20 weeks gestation. All efforts should be made to resuscitate infants born at 20 weeks gestation or later – these patients should be transported to a level 3 or 4 NICU. If there is any doubt about the gestational age, continue resuscitative efforts and transport to a hospital with a level 3 or 4 NICU.

Providers may call Medical Control to request termination of resuscitative efforts after they have started resuscitating a newly born patient and then determined that the fetus was less than 20-week gestation. If the mother did not have prenatal care or is not able to give a history, continue resuscitative efforts and transport the patient. **(See neonate resuscitation for more information)**

- Standard resuscitation should be initiated for all cardiopulmonary arrest patients in whom the mechanism of injury does not correlate with a traumatic cause of arrest.

- Standard resuscitation should be initiated for cardiopulmonary arrest victims of lightning strike or drowning in whom there is significant hypothermia.

- Immediate transportation to the ED should be initiated for children who exhibit witnessed signs of life before traumatic cardiopulmonary resuscitation and have CPR ongoing or initiated within 5 minutes in the field, with resuscitation maneuvers including airway management and intravenous or intraosseous line placement planned during transport.

- Following blunt and penetrating trauma in victims in whom there is an unwitnessed traumatic cardiopulmonary arrest, a longer period of hypoxia may be presumed to have occurred. High quality CPR with an advanced airway should continue for at least 30 minutes prior to considering termination of resuscitation.

- If there is any doubt as to the circumstances or timing of the traumatic cardiopulmonary arrest, resuscitation should be initiated and continued until arrival to the appropriate facility.

- Providers should talk to the family prior to termination or resuscitation and explain that the injuries are not compatible with life and that the child has already died. If the family insists that providers continue resuscitative efforts, continue CPR and transport to the closest appropriate facility where there will be more resources to support the family.

For termination of resuscitation of a pediatric patient (<18 years old), providers must call Medical Control to discuss the case and request withholding of resuscitative efforts or termination of resuscitation. When in doubt, it is always better to resuscitate the pediatric patient.

Death Notification: The GRIEVING Mnemonic

Death notification is an action that no EMS provider should take lightly. It is an event that is a common albeit unfortunate occurrence in the prehospital setting and EMS providers should seek proper coaching and instruction prior to performing.

G-GATHER

Gather the patient's family and friends who are at the scene.

R-RESOURCES

Utilize resources that are available to you, including police. Families respond to unexpected news of death of a loved one in unpredictable ways. This can sometimes manifest as violence towards the care provider. It is not always necessary to have police at the scene, but It is important to always have an available exit if things turn

violent. If the scene is unsafe, please leave.

I-IDENTIFY

Identify yourself as the paramedic provider. Identify the deceased patient by name. Have family/friends present identify their relation to the deceased (Ask "How is everyone related to _"). Identify what the family knows about the situation ("What do you know about what has happened?").

E-EDUCATE

Educate the family on the events leading up to the patient's death. This includes events that happened with EMS. Remember to avoid medical jargon and use simple language.

V-VERIFY

Verify that the family member has died. Use the words "dead" or "died." Avoid euphemisms like "passed away" or "no longer with us."

_ GIVE SPACE

Allow the loved one's time and space to absorb the information. There will be a lot of silence and it may be uncomfortable, however there needs to be time for the family to process the information.

I-INQUIRE

Inquire if there are any questions. Answer them to the best of your knowledge. If you do not know, be honest and open.

N-NUTS AND BOLTS

Start planting the seeds about logistical tasks. This includes the coroner and police. This all does not have to be discussed immediately and is variable depending on the patient's situation. Offer to have the family see the patient if they desire.

G-GIVE

Give the family your name, condolences, and sympathies. Use the name of the person who has died. Offer to answer any questions.

VII. NOTATIONS AND REFERENCE

Medications

Adenosine	0.1mg/kg (max 6mg) IV/IO	repeat 0.2 mg/kg (max 12mg)
Amiodarone	5 mg/kg IV/IO (max 300 mg)	repeat 15 mg/kg (max 300 mg)
Atropine	0.02 mg/kg IV/IO (minimum dose = 0.1mg) max single dose child = 0.5mg, max single dose adolescent = 1mg	repeat x 1
Calcium Chloride	20 mg/kg IV/IO	slow IVP (not proven helpful in cardiac arrest)
Epinephrine	0.01 mg/kg (1:10,000) IV/IO	repeat q3-5 minutes
Dexamethasone	0.6 mg/kg IV/IO (max 10 mg)	once

Glucose	0.5-1 g/kg IV/IO	D25: 2 ml/kg D50: 1ml/kg
Magnesium	50mg/kg IV/IO (max 2g)	give over 10-20 min, faster in torsades
Naloxone	0.1 mg/kg IV/IO	if cardiac arrest, 1-2 mg IV/IO

APGAR

An APGAR score is required at 1 and 5 minutes postpartum. Perform life-saving interventions immediately after birth as necessary. **The APGARs are calculated after the patient is stabilized based on how the patient appeared at 1 and 5 minutes of life.**

Clinical Sign	0 (zero)	1 point	2 points
Appearance	Blue or pale	Pink body with blue extremities	Completely pink
Pulse	Absent	Below 100	Over 100
Grimace	No response	Grimaces	cries
Activity	Limp	Some flexion	Active motion
Respiratory	Absent	Slow; irregular	Good, strong cry

A score of 7 – 10 is associated with coughing and crying within seconds of delivery. Newborns with this score typically do not require any further resuscitation.

A score of 4 – 6 are moderately depressed. They will typically appear pale or cyanotic and have respiratory complications and flaccid muscle tone. These newborns will require some type of resuscitation efforts.

Pediatric Glasgow Coma Scale

	Child	Infant	Score
Eye Opening	Spontaneous	Spontaneous	4
	To Speech	To speech	3
	To pain only	To pain only	2
	No response	No response	1
Best Verbal Response	Oriented appropriate	Coos & babbles	5
	Confused	Irritable cries	4
	Inappropriate words	Cries to pain	3
	Incomprehensible sounds	Moans to pain	2
	No response	No response	1
Best Motor Response	Obeys commands	Moves spontaneously & purposefully	6
	Localizes commands	Withdraws to touch	5
	Withdraws in response to pain	Withdraws in response to pain	4
	Flexion in response to pain	Abnormal flexion posture to pain	3
	Extension in response to pain	Abnormal extension posture to pain	2
	No response	No response	1

Term Newborn Vital Signs

Heart rate 120 – 160
Respiratory rate 30 – 60
SBP 56 – 90 mm/Hg
DBP 26 – 56 mm/Hg
Glucose ≥ 40 mg/dL

Portions include excerpts from:
Gross T, Donofrio-Odmann J. Pediatric Medical Priorities. In: Brice J, Cone D, Delbridge T, Myers B eds. *Emergency Medical Services: Clinical Practice and Systems Oversight.* New Jersey: John Wiley & Sons, Inc.; in press.

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Pediatric Cardiac Arrest

If no advanced airway present:
Give compressions & ventilations
Single rescuer = 30:2 ratio

If advanced airway present:
Provide continuous compressions and give one breath every 2-3 sec

Confirm patient is pulseless or HR <60 if <8yo
Begin **CPR** @ 100-120 compressions/min
with ventilation via BVM started ASAP

[1]AHA 2020 guidelines recommend administering Epinephrine ASAP after initiating CPR
(i.e. do not wait 5 min)

- Apply cardiac monitor and defibrillator pads
- Assess cardiac rhythm

Ventricular Fibrillation/ Pulseless VT

Defibrillate at 2J/kg once
(max = adult dose)
Resume **CPR** immediately

- Establish IV/IO access
- **Epinephrine 0.1mg/ml (1:10,000)**[1]
  0.01mg/kg IV/IO q3-5min (max = 1mg/dose)
  MAX 3 DOSES
- Insert advanced airway (ETT or SGA)
- Initiate continuous $EtCO_2$ monitoring
- Apply Impedance Threshold Device (ITD), if available, for patient ≥ 12 years old

If VF/pVT persists after 2 min:

Defibrillate at 4J/kg
Resume CPR immediately for an additional 2 minutes

If VF/pVT persists after an additional 2 min:

Defibrillate → **CPR** → Rhythm Check
q2min until ROSC, asystole, or PEA

Defib dose = 4J/kg (consider escalating dose to 10J/kg)

After 3rd shock: **Amiodarone** 5mg/kg IV/IO
may repeat bolus x2 prn
(max 300 mg total)

If torsade de pointes: **Magnesium Sulfate** 50mg/kg IV/IO
(max 2 g)

Search and treat reversible causes

Asystole/PEA

- Establish IV/IO access
- **Epinephrine 0.1mg/ml (1:10,000)**[1]
  0.01mg/kg IV/IO q3-5min (max = 1mg/dose)
- Insert advanced airway (ETT or SGA)
- Initiate continuous $EtCO_2$ monitoring
- Consider **Atropine 0.1 mg/kg** if CODE being worked as result of HR < 60 bpm
- Apply Impedance Threshold Device (ITD), if available, for patient ≥ 12 years old

Search and treat reversible causes

Continue **CPR** with rhythm/pulse check q2min until ROSC or Termination of Resucitation

Patients must be worked on-scene for a minimum of 30 minutes. CPR may be performed in back of ambulance to facilitate scene safety.

Reversible Causes of Cardiac Arrest (Hs & Ts)

Hypovolemia - 20mlg/kg NaCl bolus (max 60ml/kg)
Hydrogen ion (acidosis) – ventilatory support
Hypoglycemia – Dextrose 10% or Dextrose 25%
Hyperkalemia – Calcium Chloride 20mg/kg IV/IO (max 1g)
Hypokalemia – (*treat in hospital)*
Hypothermia – rewarming (ex. blankets, hot packs)
Hypoxia – supplemental Oxygen

Toxins – Naloxone 0.1mg/kg for opiates
Tension pneumothorax – 1.5 inch (not 2 in) 14/16G needle
Trauma - 20mlg/kg NaCl bolus (max 60ml/kg)
Tamponade (cardiac)
Thrombosis, pulmonary (i.e. PE)
Thrombosis, coronary (i.e. STEMI)

Pediatric Upper Airway Obstruction: Croup/Stridor

Routine Medical Care

- Give 100% **Oxygen** via NRB mask
- Assist ventilations with BVM as needed
- Suction [bulb or mechanical] if excessive secretions are present

Attempt to keep child calm, avoid undue distress
Allow for position of comfort

Cardiac Monitor / Pulse ox / ETCO2

Stridor at Rest?

No → Continue to monitor and reassess frequently during transport

Yes

Inhaled Epinephrine 1mg/ml (1:1000)
3ml via NEBULIZER (no dilution needed)
May repeat prn if stridor at rest still present
no max dose

Respiratory Distress?

No → **Dexamethasone** (if available)
0.6 mg/kg PO/IV/IM/IO
(max 16mg)
** It is safe to give IV form orally, if tolerated**

Yes

Assist Ventilations with BVM

If unable to ventilate/oxygenate, place
Supraglottic Airway or Endotracheal Intubation
(airway should be managed in least invasive way possible)

Consider Atropine 0.1 mg/kg

Assess for hypoperfusion and consider IV/IO access with NaCl 20ml/kg bolus

The benefits of IV/IO access and fluid should outweigh the increased distress caused to the child

Contact **Medical Control** for additional orders or consultation

Croup usually affects children under the age of 3 and is associated with cold symptoms, hoarse voice, and barking cough

Serious signs / symptoms:

- **Significant inspiratory stridor at rest (i.e. when child is not coughing or crying)**
- **Decreased responsiveness**
- **Apnea or cyanosis**
- **Inability to tolerate secretions**

Always also consider the possibility of foreign body aspiration

Pediatric Lower Airway Obstruction: Wheezing due to Bronchiolitis

Consider bronchiolits in patients under 2 yo, with recent URI, and with no history of asthma.
If patient has a hx of prematurity, asthma, prior albuterol use, or a family history of asthma, use the Lower Airway Obstruction: Asthma/Wheezing guideline instead.

Signs of impending respiratory failure:

- Nasal Flaring
- Accessory Muscle Use
- "Silent Chest"
- "Silent Cry"
- Head Bobbing

Routine Medical Care

- Suction the nose and/or mouth via bulb suction or properly sized suction catheter (wear PPE while suctioning)
- Administer **Oxygen** to obtain SpO2 > 90% (escalate from nasal cannula to face mask or non-rebreather mask as needed)

Cardiac Monitor/Pulse Ox/EtCO2

Is Response to Treatment Adequate?

Yes

- Transport in position of comfort
- Continue monitoring and reassessment during transport
- Be prepared to assist ventilations with BVM as needed

No

- Re-suction the nose and/or mouth
- Assist ventilations with BVM as needed for respiratory failure

Age Appropriate Assisted Ventilation Rates

Neonates (<1 mo): 40 bpm
Infants (<1 yo): 30 bpm
Children (> 1yo): 20 bpm

Is Response to Treatment Adequate?

Yes

No

Consider IV/IO access with **Crystalloid Fluid** 20ml/kg bolus if signs of hypoperfusion/shock

Inhaled Epinephrine 1mg/ml (1:1000)
3ml via NEBULIZER
Hold mask on the child's face

Contact **Medical Control** for additional orders or consultation

Bronchiolitis is a viral illness characterized by fever, copious secretions, and respiratory distress It is typically seen November through April

The most important interventions are to provide supplemental oxygen and suction secretions adequately and often

Pediatric Lower Airway Obstruction: Asthma/Wheezing > 2 yo

Use this guideline for patients ≥ 2 years old with wheezing. Also consider this guideline for patients < 2 years old with a history of asthma, history of prematurity, family history of asthma, or who have responded to albuterol in the past.

Routine Medical Care

- Suction the nose and/or mouth via bulb or suction catheter if excessive secretions are present
- Assist ventilations with BVM as needed for respiratory failure

Signs of impending respiratory failure:

- Nasal Flaring
- Accessory Muscle Use
- "Silent Chest"
- "Silent Cry"
- Head Bobbing

Duo-Neb via Nebulizer

Albuterol Sulfate
< 4 yo: 2.5mg
≥ 4 yo: 5mg

Ipratropium Bromide
500mcg (i.e 0.5mg)

(may repeat duoneb x 2 while administering other treatments)

continue duonebs prn while en route

Age Appropriate Assisted Ventilation Rates

Neonates (<1 mo): 40 bpm
Infants (<1 yo): 30 bpm
Children (≥ 1yo): 20 bpm

If severe respiratory distress:

IM Epinephrine 1mg/ml (1:1000)
(Thigh is preferred site)
< 25kg: 0.15 mg IM
≥ 25kg: 0.3 mg IM

Is Response to Treatment Adequate?

Yes

Dexamethasone 0.6mg/kg PO/IV/IM/IO (max 16mg)

** It is safe to give IV form orally, if tolerated **

- Continue monitoring and reassessment during transport
- Be prepared to assist ventilations as needed

No

- Start IV/IO
- **Dexamethasone** 0.6mg/kg PO/IV/IM/IO (max 16mg)
- **NaCl** 20ml/kg bolus if dehydration is suspected or patient is hypotensive
- Consider **Magnesium Sulfate** 50mg/kg IV over 10 min (max 2g) *may cause hypotension*

Is Response to Treatment Adequate?

Yes

No

- Assess for pneumothorax
- Assist ventilations with BVM as needed

Contact **Medical Control** for additional orders or consultation

Pediatric Anaphylaxis / Allergic Reaction

(a) Evaluate for non-anaphylactic allergic reaction versus anaphylaxis
(b) Consider other specific protocols. e.g. airway management, breathing difficulty, shock

Routine Medical Care

Determine Severity of Reaction

Non-Anaphylactic Allergic Reaction

Diphenhydramine
1 mg/kg IV/IO/IM (max 50mg)

- Treat stridor as indicated in the **Upper Airway Obstruction** guideline.
- Treat wheezing and chest tightness as indicated in the **Lower Airway Obstruction** guideline.

Anaphylaxis

IM Epinephrine 1 mg/ml (1:1000)
(Thigh is preferred site)
If < 25kg, 0.15 mg IM
If > 25kg, 0.3 mg IM
May repeat x 1 after 5 min

Diphenhydramine
1 mg/kg IV/IO/IM (max 50mg)

Crystalloid Fluid 20 mL/kg bolus IV/IO if hypotensive. Repeat x 1 prn

Methylprednisolone[1] 2mg/kg (max 125mg) IV/IO/IM or
Dexamethasone 0.6mg/kg PO/IV/IM/IO (max 16mg)
** It is safe to give IV form orally, if tolerated **

Medical Control for further orders
Consider **Epinephrine** infusion
0.01-0.5 mcg/kg/min
if signs of anaphylaxis persist

Non-anaphylactic allergic reaction: symptoms involve only one organ system, generally considered a mild or moderate reaction

Anaphylaxis: more severe reaction that meets one of the following criteria:

A. Two or more body systems affected rapidly after exposure
- Skin involvement (rash, generalized itching)
- Mucosa involvement (angioedema, throat tightening sensation)
- Respiratory compromise (dyspnea, wheezing, stridor)
- Persistent GI involvement (vomiting, diarrhea, abdominal pain)
- Altered mental status, syncope, incontinence

or

B. Hypotension (for age) or respiratory compromise after known allergen exposure *(having two systems involved is not required)*

- **The mainstay of treatment for anaphylaxis is epinephrine.** Consider immediate IM epinephrine prior to IV/IO access in critically ill patients. Administration to the thigh is the fastest IM site. Use either the vastus lateralis or the rectus femoris.
- If patient has their own epinephrine via auto-injector you may assist them with using it.
- A dystonic reaction (to phenothiazines) is an adverse reaction **NOT** an allergic reaction. Patients may receive **Diphenhydramine** 1-2 mg/kg IV/IM.
- Reassess frequently for signs of deterioration, including impending airway obstruction

[1] Corticosteroids are not indicated as initial treatment for anaphylaxis in the place of epinephrine; they can be given as adjunctive therapy after the administration of epinephrine but should be considered optional.

Pediatric Tachycardia

- Maintain airway
- Assist with BVM as needed
- Oxygen via NC, NRB, BVM
- 3 lead or 12 lead EKG

Routine Medial Care
12-lead EKG

- Pulse oximetry (SpO_2)
- End tidal capnometry ($EtCO_2$)
- IV/IO access
- Blood glucose

Evaluate QRS Duration

Narrow Complex Tachycardia (QRS ≤ 0.09 seconds)

Wide Complex Tachycardia (QRS > 0.09 seconds)

Evaluate EKG Rhythm

Probable Supraventricular Tachycardia (SVT)

- Vague, nonspecific history with abrupt rate changes
- P waves absent /abnormal
- Heart Rate not variable
- Infant rate usually over 220/min
- Child rate usually over 180/min
- Consider Valsalva Maneuver or ice to the face if there are no signs of shock, hypotension, poor perfusion, or altered mental status.
- Do not delay adenosine for valsalva.

Place pads on patient's chest prior to administering adenosine

Adenosine 0.1 mg/kg IV
max 6mg (first dose).
If second dose is needed, double the first dose (max 12mg)

IF UNSTABLE
Synchronized cardioversion:
0.5 – 1 J/kg (max 100J)
If repeat cardioversion is needed, 2 J/kg
(max 200J)

Probable Sinus Tachycardia

- Compatible History with consistent known cause
- P waves present/normal
- Variable R-R
- Constant PR interval
- Infant rate usually under 220/min
- Child rate usually under 180/min

- Support ABC's
- O_2 as needed
- Consider sepsis and shock
- Observe
- Transport

Possible Ventricular Tachycardia

Cardiopulmonary Compromise Present?

- Hypotension?
- Acute Altered Mental Status?
- Signs of Shock?

Yes

Synchronized cardioversion:
0.5 – 1 J/kg
(max 100J)
If repeat cardioversion is needed, 2 J/kg
(max 200J)

If torsades de pointe (polymorphic VT)
Magnesium Sulfate
50 mg/kg IV/IO
over 20 min (max 2g)

No

Place pads on patient's chest prior to administering adenosine

If rhythm is regular and monomorphic:
Adenosine
0.1 mg/kg IV
max 6mg (first dose).
If second dose is needed, double the first dose (max 12mg)

Contact **Medical Control** for additional orders or consultation

Consider Contributing Factors (Hs & Ts)

Hypovolemia
Hydrogen ion (acidosis)
Hypoglycemia
Hyper-/Hypokalemia
Hypothermia
Hypoxia
Trauma
Tension Pneumothorax
Tamponade (cardiac)
Thrombosis, pulmonary
Thromobosis, coronary

Pediatric Bradycardia

Pediatric patients become bradycardic just prior to arrest – Look at your patient not the monitor

- Patients perfusing well and without respiratory compromise usually do not require emergency treatment for bradycardia
- [1]Chest compressions should not be delayed for an EKG and should continue while bradycardia is being treated.
- **The most common cause of pediatric bradycardia is hypoxemia – recognize it and treat it quickly**

Cardiopulmonary Compromise Present?
- Hypotension
- Acute Altered Mental Status?
- Signs of Shock?

No

- Support ABC's
- O_2 as needed
- Obtain 12 Lead EKG
- Observe
- Transport
- Identify and treat underlying causes

Use caution when intubating and suctioning patients <1 yo - excessive vagal stimulation can cause further bradycardia.

Contact **Medical Control** for additional orders or consultation

Yes

If HR <60 and <8 yo
Start CPR immediately[1]

- Ensure adequate oxygenation/ventilation
- Obtain 12 Lead EKG

Poor Perfusion and/or Compromise Persists?

No

Yes

Push Dose Epinephrine 10mcg/ml (1:100,000)
1 mL/min IV/IO (3 doses total)
titrate to maintain age-appropriate SBP
Do NOT administer dose faster than 1ml/min

[3]While preparing infusion, consider
Push Dose Epinephrine 1ml IV/IO over 1 min
May repeat q5min x 2 (3 doses total)

To Make:
Using a 1ml syringe, draw 0.1ml of 0.1mg/ml (1:10,000) Epinephrine and 0.9 ml of NS (syringe = 10mcg/ml Epinephrine)

contraindicated in traumatic shock

If bradycardia or age-appropriate hypotension persists:
Epinephrine 0.1mg/ml (1:10,000)
0.01 mg/kg IV/IO q 5 min prn (max 1mg)

If the bradycardia is due to vagal stimulation or AV block:
Atropine Sulfate 0.02 mg/kg IV/IO
(min dose 0.1mg, max single dose 0.5mg)
repeat x 1 prn

Pacing (TCP) as needed to support cardiorespiratory function
- Initial rate of 80 beats per minute
- increase milliamps until capture is gained
- Increase the rate as needed until patient is hemodynamically stable

Reversible Causes of Bradycardia (Hs & Ts)

Hypovolemia - 20mlg/kg NaCl bolus (max 60ml/kg)
Hydrogen ion (acidosis) – Ventilatory Support
Hypoglycemia – Dextrose 10% or Dextrose 25%
Hyperkalemia – Calcium Chloride 20mg/kg IV/IO (max 1g)
Hypokalemia – (*treat in hospital)*
Hypothermia – rewarming (ex. blankets, hot packs)
Hypoxia – supplemental Oxygen

Toxins – Naloxone 0.1mg/kg for opiates
Tension pneumothorax – 1.5 inch (not 2 in) 14/16G needle
Trauma - 20mlg/kg NaCl bolus (max 60ml/kg)
Tamponade (cardiac)
Thrombosis, pulmonary (i.e. PE)
Thrombosis, coronary (i.e. STEMI)

Pediatric Shock

[1]Manage anaphylactic shock as per **Pediatric Anaphylaxis** guideline

[2] Alert the hospital if you have a sepsis patient!

Risk Factors for Septic Shock

Cancer
Sickle Cell disease
Catheters (PICC, Foley, etc)
Immune deficiency or compromise
History of transplant
Severe developmental delay

Routine Medical Care / Trauma Care
- Include temperature
- Look for associated injuries

Place 1 or 2 IVs of the largest size possible (consider IO after two unsuccessful attempts)

Consider etiology of shock state

General Signs of Shock

- Altered mental status
- Delayed/flash capillary refill
- Weak or decreased pulses
- Tachycardia*
- Elevated RR
- Hypoxemia
- Hypotension for age
- Decreased urine output

sometimes tachycardia is the only symptom

Normal SBP = 70 + (age in yrs x 2)

[1]Anaphylactic | [2]Septic | Hypovolemic | Neurogenic

Crystalloid Fluid bolus
20 mL/kg IV/IO (max 1L)
deliver bolus as quickly as possible
(infuse over <15 minutes)

Obstructive

- High flow **O_2** via NRB
- Evaluate lung sounds
- Decompress tension pneumothorax (consult **Med Control** prn)

Cardiogenic

- Evaluate lung sounds
- **Crystalloid Fluid bolus** 10 mL/kg IV/IO (max 500 mL)

- Reassess vital signs and perfusion
- Look for signs of fluid overload (ex. JVD, crackles, hepatomegaly, hx of heart failure)

Are there signs of fluid overload?

No → Repeat prior **Crystalloid Fluid bolus** 20 ml/kg (if cardiogenic 10ml/kg)

Yes → Start **Epinephrine infusion**[3] 0.01-0.5 mcg/kg/min

[3]Consider Vasopressor Infusion:
Epinephrine 0.01–0.5 mcg/kg/min
or
Norepinephrine 0.01–0.5 mcg/kg/min

[3]While preparing infusion, consider
Push Dose Epinephrine 1ml IV/IO - may repeat q5min x 2 (3 doses total)
Do NOT administer faster than 1ml/min
To Make:
Using a 1ml syringe, draw 0.1ml of 0.1mg/ml (1:10,000) Epi and 0.9 ml of NS (syringe = 10mcg/ml Epinephrine)
* contraindicated in traumatic shock*

Normal Vital Signs by Age

AGE	HEART RATE (beats/min)	BLOOD PRESSURE (mmHg)	AGE	HEART RATE (beats/min)	BLOOD PRESSURE (mmHg)
Premature	120-170	55-75/35-45	1-3 yr	70-110	90-105/55-70
0-3 mo	100-150	65-85/45-55	3-6 yr	65-110	95-110/60-75
3-6 mo	90-120	70-90/50-65	6-12 yr	60-95	100-120/60-75
6-12 mo	80-120	80-100/55-65	12+ yr	55-85	110-135/65-85

Contact **Medical Control** for additional orders or consultation

Pediatric Altered Mental Status

Differential Diagnosis

- **A** Alcohol, Anemia, Anaphylaxis
- **E** Epilepsy, Electrolytes, Encephalopathy
- **I** Insulin, Inborn Errors, Intussusception
- **O** Oxygen, Opiates
- **U** Uremia
- **T** Trauma, Tumor, Temperature
- **I** Infection, Ingestion
- **P** Poison, psychiatric
- **S** Shock, Space occupying lesion

How to make:

D25: remove/discard 25ml of D50 from ampule & replace with 25ml of NaCl

D10: remove/discard 40ml of D50 and replace with 40ml of NaCl

General Signs of Shock[1]

- Altered mental status
- Delayed/flash capillary refill
- Weak or decreased pulses
- Tachycardia*
- Elevated RR
- Hypoxemia
- Hypotension for age
- Decreased urine output

sometimes tachycardia is the only symptom

Normal SBP = 70 + (age in yrs x 2)

Routine Medical Care (including CO_2 & temperature)

Upper airway or respiratory compromise? **Yes** → Give **Oxygen** via NRB mask or BVM; Go to appropriate **Pediatric Upper** or **Lower Airway Obstruction** guideline

No

Bradycardia if < 8 yo? **Yes** → **Pediatric Bradycardia guideline**

No

Suspicion of opiate/opioid ingestion? **Yes** → Give **Naloxone** 0.1mg/kg (max 2mg) q3min IV/IO/IN – titrate prn

No

Signs of shock?[1] **Yes** → **Pediatric Shock guideline**

No

Obvious signs of trauma? **Yes** → **Routine Trauma Care & appropriate Trauma guideline**

No

Capillary Blood Glucose (CBG) < 60 mg/dl? (<40 mg/dl if newborn) **Yes** → **Dextrose 25%** 2ml/kg age 1-7yo; **Dextrose 10%** 5ml/kg age <1 yo

No

Recent or current seizure activity? **Yes** → **Pediatric Seizure guideline**

No

Positive Cincinnati Prehospital Stroke Scale? **Yes** → **Adult Stroke guideline**

No

Consider other causes of AMS:
e.x. encephalopathy, CO poisoning, anaphylaxis, psychiatric

Contact **Medical Control** for additional orders or consultation

Pediatric Seizure

Consider febrile seizures in patients under the age of 5 who have no seizure history and have a fever

Routine Medical Care

- Check pulse
- Reassess ABCs
- Give supplemental oxygen

How to make:

D25: remove/discard 25ml of D50 from syringe & replace with 25ml of NaCl

D10: remove/discard 40ml of D50 and replace with 40ml of NaCl

Is patient actively seizing upon EMS arrival?

Yes

Administer **Midazolam** 0.2mg/kg IM/IN (max 5mg) prior to obtaining IV access

- Obtain IV access
- Check capillary blood glucose

If CBG <60 mg/dl, give **IV/IO Dextrose**

Dextrose 25% 2ml/kg age 1-7

Dextrose 10% 5ml/kg age < 1

After 5 min is patient still seizing?

Yes

No

- Symptomatic care
- Look for signs of trauma and/or head injury
- Obtain IV access prior to transport

No

- Symptomatic care
- Look for signs of trauma and/or head injury

- Obtain IV access
- Check capillary blood glucose

If CBG <60 mg/dl, give **IV/IO Dextrose**

Dextrose 25% 2ml/kg age 1-7

Dextrose 10% 5ml/kg age < 1

Contact **Medical Control** for additional orders or consultation

Generalized or complex partial seizure activity begins in the presence of EMS?

Yes

Give Benzodiazepine (Midazolam is 1st choice if available):

Repeat dose q5min x1 (two doses total)

Midazolam 0.1mg/kg IV/IO (max 2mg)
0.2mg/kg IM/IN (max 5mg)

Lorazepam 0.1mg/kg IV/IO/IM (max 4mg)

* do not give Lorazepam via IN route

- Universal seizure precautions: (a) ensure airway patency – do not force anything between teeth, (b) keep patient on side, (c) protect patient from injury, (d) suction as needed, (e) check pulse immediately after seizure stops
- Status epilepticus is defined as continuous seizure activity ≥ 5 minutes without return of consciousness or 2 or more seizures without an intervening period of neurologic recovery. **Status epilepticus should be treated the same regardless of the type of seizure.**

Pediatric Sepsis – Suspected / Septic Shock

SEPSIS:
"a life-threatening organ dysfunction caused by a dysregulated host response to infection." and should be treated as "a life-threatening condition that arises when the body's response to an infection injures its own tissues and organs."

Routine Medical Care

Vital Signs Including Temperature

The SIRS (Systemic Inflammatory Response System) criteria represent a series of objective physical and laboratory findings indicative of an infectious or non-infectious insult provoking a systemic immune response.

Pediatric SIRS Criteria (Systemic Inflammatory Response Syndrome)
Obvious or Suspected Infection **PLUS ANY** of the following criteria:
Temperature >100°F or <96°F AND Heart Rate

- 1 month – 1 year > 180 bpm
- 2 – 5 years > 140 bpm
- 6 – 12 years > 130 bpm
- 13 – 18 years > 120 bpm

No

Hypotension for Age	
Age	Systolic Blood Pressure
> 10 years	< 90 mmHg
1-10 years	< 70 + (2 x age in years)
< 1 year	< 70 mmgHg

Reference charts

$EtCO_2$ ≤ 25mmHg OR
These levels are associated with serum lactate levels > 4 mmol/L.
Hypotensive *OR* ANY of these criteria * See reference charts

No

Routine Medical Care[2]

Patients with suspected sepsis may not have a low $EtCO_2$ reading.

Consider sepsis based on clinical presentation.

Yes

Criteria for consideration

- Immunocompromised
- Developmental Delay
- Cancer Patient
- Catheter – PICC or Foley
- S / S of poor perfusion
- Sickle Cell Patient

Yes

Consider Sepsis
Call **SEPSIS ALERT** to receiving ED

20 mL/kg or 1 liter fluid bolus w/ LifeFlow IV / IO (**LR**[3])
with reassessment* *max 60 mL/kg or 3 liters unless clinical concern for fluid overload
If signs of fluid overload or age appropriate Hypotension after MAX Bolus – STOP FLUIDS and START EPI
Push Dose Epinephrine IV/IO
10 mcg/ml [1:100,000] 1 ml/min
or
Epinephrine Drip IV/IO 0.01 – 0.5 mcg/kg/min
or
Norepinephrine Drip IV/IO 0.1 - 2 mcg/kg/min
Titrate to age appropriate BP: SBP ≥ 70 + 2 x Age

[3] Lactated Ringers are the crystalloid of choice for the resuscitation of septic patients when available.

****AGES 2 months and older****

Cefepime 50 mg/kg/dose IV / IO
Max Dose 2 gm
***Do Not administer if pt has allergy to: ***
Penicillin – PCN
Cephalexin - Keflex

History:

- Age
- Fever
- Previous Infection
- Immunocompromised
- Bedridden / Immobilized patient
- Recent Surgery
- Developmental Delay
- Cancer
- Catheter – PICC or Foley
- Transplant

Contact Medical Control for consultation or further orders

Signs / Symptoms:

- Hyper/Hypothermia
- Chills
- Rash
- Altered Mental Status
- Myalgias
- Cough
- Dysuria

Pediatric Nausea / Vomiting & Dehydration

Routine Medical Care
(including temperature)

Intractable nausea/vomiting related to illness, intoxication or pre-hospital narcotic administration?

YES

Give Ondansetron:
2mg IV/IO/PO (8-15 kg)
4mg IV/IM/PO (> 15 kg)
* IV form may be given orally in the same dose *

- Consider **Crystalloid** fluid bolus 20 mL/kg (10mL/kg for neonates) if signs or symptoms of dehydration are present[1]
- Treat hypovolemic shock as per **Pediatric Shock** guideline – may repeat crystalloid bolus x 2 if needed

Contact **Medical Control** for additional orders or consultation

Normal Vital Signs by Age		
AGE	HEART RATE (beats/min)	BLOOD PRESSURE (mm Hg)
Premature	120-170*	55-75/35-45
0-3 mo	100-150*	65-85/45-55
3-6 mo	90-120	70-90/50-65
6-12 mo	80-120	80-100/55-65
1-3 yr	70-110	90-105/55-70
3-6 yr	65-110	95-110/60-75
6-12 yr	60-95	100-120/60-75
12+yr	55-85	110-135/65-85

*In sleep, infant heart rates may drop significantly lower but if perfusion is maintained no intervention is required

[1] Signs and Symptoms of Dehydration/Shock:

- Tachycardia
- Lethargy
- Pale, cool extremities
- Absent tears
- Sunken fontanelle
- Poor skin turgor
- Capillary refill > 2 seconds
- Weak peripheral pulses

normal SBP = 70 + (age in yrs x2)

Pediatric Traumatic Pain Management

Routine Medical Care / Trauma Care

- Evaluate mechanism of injury
- Assess the need for spinal precautions per **Spinal Motion Restriction** guideline

Attempt comfort therapies first:
- Place patient in position of comfort
- Splint/support painful areas
- Consider ice and/or compresion

Record level of pain by either asking patient to rate on scale 1-10 or using FACES scale

<u>Administer **one** of the following for moderate to severe (4-10) pain:</u>

Ketorolac [Toradol] 0.5 mg/kg IV/IO/IM (max 15 mg)
<u>or</u>
Fentanyl IV 1mcg/kg (max 50 mcg)
<u>or</u>
Fentanyl IN 1 – 2mcg/kg (max 100mcg)
<u>or</u>
Morphine Sulfate
0.05mg/kg IV (< 1 year od)
0.1mg/kg IV (≥ 1 year old)
<u>or</u>
Ketamine 0.2 mg/kg IV/IO/ IV Drip (max 25 mg)

Reassess pain level 5-10 min after treatment

If pain remains severe (score: 8-10)
contact Medical Control
for additional orders to

repeat **Fentanyl** or **Morphine** dose

Have **Naloxone** readily available to treat narcotic-induced respiratory depression.

[1]Wong-Baker FACES of pain rating scale.

Neonatal Resuscitation

[1]Preductal SpO2 Target

1 min 60-65%
2 min 65-70%
3 min 70-75%
4 min 75-80%
5 min 80-85%
10 min 85-95%

[1]Measure on patient's right hand

[2] Initial HR assessment is most accurate using a stethoscope placed on the left side of the chest

Term Newborn Vital Signs

Heart rate 120 – 160
Respiratory Rate 30 – 60
SBP 56 – 90 mm/Hg
DBP 26 – 56 mm/Hg
Glucose ≥ 40 mg/dL

Birth

Term Gestation? Good Tone? Breathing or Crying?

Yes → No resuscitation is needed; dry the newborn and keep warm. Clear/suction secretions if needed.

No

1 minute

Keep the newborn warm. Position, dry to stimulate breathing, oxygenate prn, clear/suction secretions as needed

Inadequate breathing? [2]HR < 100/min?

No → Labored breathing or persistent cyanosis?

Yes

Positive Pressure Ventilation
EKG monitoring
SpO_2 monitoring[1]

Yes

Position and clear airway
SpO_2 monitoring
Supplemental O2 as needed
Positive pressure ventilation PRN

HR <100/min?

No → Post Resuscitation Care

Yes

Check chest rise/fall
Take ventilation corrective steps
ETT as needed (x1 attempt)

30 seconds

HR <60/min?

No

Yes

Chest compressions and ventilatory support to correct HR.
(Use a 3:1 ratio unless suspected cardiac etiology, then use a 15:2 ratio)
After 2 minutes of chest compressions and ventilatory support without a spontaneous return of HR > 60 administer
Epinephrine 0.1mg/ml (1:10,000) 0.01 to 0.03mg/kg IV/IO

HR <60/min after 60 seconds of CPR?

Yes

Consider hypovolemia
Consider pneumothorax

Contact **Medical Control** for additional orders or consultation

APGAR SCORING SYSTEM

	0 Points	1 Point	2 Points	Points totaled
Activity (muscle tone)	Absent	Arms and legs flexed	Active movement	
Pulse	Absent	Below 100 bpm	Over 100 bpm	
Grimace (reflex irritability)	Flaccid	Some flexion of Extremities	Active motion (sneeze, cough, pull away)	
Appearance (skin color)	Blue, pale	Body pink, Extremities blue	Completely pink	
Respiration	Absent	Slow, irregular	Vigorous cry	

APGAR score at 1 and 5 minutes postpartum

Severely depressed	0-3
Moderately depressed	4-6
Excellent condition	7-10

Routine intubation for tracheal suction with presence of meconium-stained amniotic fluid is NOT recommended. It is only indicated if airway obstruction is suspected after providing positive pressure ventilation.

Region 1 Hospital NICU Levels and Capabilities

updated 05-03-23

Hospital	NICU LEVEL
Ochsner Baptist	**IV**
Children's Hospital	**IV**
Ochsner Main	**IV**
Ochsner West Bank	**III**
Touro Infirmary	**III**
Ochsner North Shore	**III**
Slidell Memorial Hospital	**III**
Tulane Lakeside	**III**
West Jefferson Hospital	**III**
Ochsner Kenner	**II**
East Jefferson Hospital	**II**

Levels	Qualifications
Level IV	Any neonate w/ complex health issues able to fit available equipment
Level III - surgical	< 32 weeks and/or seriously ill requiring further medical/surgical specialists
Level III	< 32 weeks and/or seriously ill . Neonate trained technicians and Cardiac Specialists available

Gestation and Signs of Life: The basic qualifications of NICUs are prescribed by the *LA State Hospital Licensing Standards (LAC 48:I9319, 9381,9405).* Any neonates requiring ventilation whose airway is too small for the 2.5mm ETT will not be a candidate for any NICU. Per the American Academy of Pediatrics Neonate Resuscitation Program, neonates younger than 23 weeks are not generally candidates for resuscitation as their anatomy is normally too small to accommodate. As prehospital providers we are unable to determine exact gestation in the field and should allow for a 4-week buffer to gestation provided by the mother.

Signs of life include:

- visible heartbeat and/or palpable pulse spontaneous breathing, crying, gasping spontaneous limb movement
- pulsation of cord following clamping
- signs must be sustained for >1 min following birth

IF SIGNS OF LIFE ARE PRESENT in a neonate, proceed with Neonate Resuscitation Guidelines and transport to nearest Level IV, or if needed, Level III NICU.

Clinical PEARL: The initial steps of resuscitation are to provide warmth by placing the infant under a radiant heat source, position the head in a 'sniffing' position to open the airway, clear the airway with a bulb syringe or suction catheter, dry the infant and stimulate breathing. Evaluation of the neonate for respiration, heart rate and color at every 30-second interval.

NICU Medical Subspecialty Requirements Each High Level NICU Unit shall meet requirements of each lower NICU				
Level I: Full Term/Near Term	Level II: ≥ 32 weeks	Level III: <32 wks	Level IIIS: < 32wks	Level IV: complex medical conditions
Board Certified/Eligible Pediatric or Family Practice Physician	Board Certified Neonatologist	Pediatric Cardiology	Pediatric Surgery	Pediatric Cardiothoracic Surgery*
	Respiratory Therapists	RT with training in Neonate Ventilation	Pediatric Anesthesiology	Pediatric Endocrinology*
	Occupational Therapist	OT/PT w/ Neonatal expertise	Pediatric Cardiology*	Pediatric Genetics
	Physical Therapist		Pediatric Gastrienterology*	Pediatric Hematology*
	Registered Dietician/Nutritionist	RD w/ training in	Pediatric Infectious Disease*	Pediatric Oncology*
	Laboratory Technician	Neonatal feeding/swalloing	Pediatric Nephrology*	
	Social Worker	Social Worker ratio 1:30	Pediatric Neurology*	
	Radiology Technician		Pediatric Neurosurgery*	
			Pediatric Orthopedic Surgery*	
			Pedatric Otolaryngology*	
			Pediatric Pulmonology*	
*Physicans shall be available on site as needed by the facilit				

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Region One Protocol Effort

HAZMAT Guidelines

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Hazardous Materials Preambles

This introduction provides a framework for providers responding to an incident involving hazardous material (HAZMAT) release and chemical, biological, radiological, nuclear, and explosives (CBRNE) agents. All EMS providers are expected to have regular HAZMAT training at the awareness level – providers should be able to recognize a HAZMAT situation and not become part of the problem. Providers should begin their response with the following assumptions:

- There will not be advanced notification for most of these incidents.
- Information regarding the hazardous agent(s) may not be available immediately.
- There are a limited number of on-duty medical first responders and transport units available.
- Many patients will not necessarily have been decontaminated prior to departing from the scene of the incident and will self-refer to nearby healthcare facilities.

I. DEFINITIONS

- **"Hazardous Materials":** substances, such as chemicals, that endanger a person's health or life when ingested, inhaled, absorbed (through the skin or mucous membranes), or injected under skin (ex. by abrasion, cut, or shot), or absorbed. These substances shall be considered a threat to the health and life of EMS personnel. A hazardous material can be identified by its location, its use, and labels, placards, and signs attached to it.

- **"Weapons of Mass Destruction (WMD)":** includes any chemical, nuclear or biological agent used in terrorist activities to threaten or inflict intentional harm or death to a given population.

- **"Nerve agents":** extremely toxic organophosphate-type chemicals, including GA (tabun), GB (sarin), GD (soman), GF (cyclosarin), and VX, which attack the nervous system and interfere with chemicals that control nerves, muscles, and glands. G-series nerve agents are odorless and invisible and can be inhaled, absorbed through the skin, or swallowed. Traditionally classified as WMDs.

- **"Decontamination":** the process by which hazardous materials are removed from an exposed person. This process may involve removal of the patient's clothing, rinsing the patient with a high- volume water bath, washing the patient's body with a neutralizing agent, and/or irrigation of the eyes. Persons who have been decontaminated shall be considered safe for evaluation and treatment by responding personnel.

II. ROLES/RESPONSIBILITIES

The HAZMAT Team or Hazardous Materials Unit (HMU), under direction of the Incident Commander, assumes responsibility for control of a HAZMAT incident. EMS personnel should coordinate treatment/transport efforts with the HAZMAT Team so as not to jeopardize scene integrity or cause unnecessary spread of contamination to the ambulance, hospital personnel, or bystanders.

(1) **HAZMAT Team** – the HAZMAT team or unit (frequently associated with the fire department) is primarily responsible for identification, rescue, and decontamination. The HAZMAT team is frequently, but not always, associated with the fire department. The responsibilities of the HAZMAT team include:

a. Identifying the hazard(s) and material(s),
b. Determining the appropriate PPE requirements,
c. Determining initial estimate of victims,
d. Determining the control zones
    i. Staging area
    ii. Hot, Warm, Cold
    iii. Gross decontamination

The HAZMAT team/unit frequently is equipped to provide temporary disposable garments to decontaminated patients to prevent hypothermia and secondary contamination.

The HAZMAT team is often not first to a scene or hazardous incident; they should be requested as an additional resource via dispatch as soon as the need is identified.

(2) **Law Enforcement Officers (LEOs)** – LEOs are responsible for managing initial area isolation and extended evacuation, and egress control for EMS. LEOs will also identify additional explosive hazards associated with explosive events and determine the control zones and staging area to prevent injuries from secondary devices.

(3) **EMS** - the responding EMS personnel assume responsibility for patient care and transportation after decontamination and release by the HAZMAT team. Roles of EMS providers include:
    a. Patient triage
    b. Patient treatment
    c. Patient transport
    d. Provision of HAZMAT-specific medical care, including,
        i. Identifying intoxicating agent
        ii. Identifying antidote or mitigating agent
        iii. Treating signs and symptoms in effort to stabilize patient
        iv. Assessing for risk of organ impairment
    e. Communications with local healthcare facilities

Any EMS personnel not trained to the technician level of HAZMAT education and equipped with Level A or B PPE should not enter a potentially hazardous scene until the HAZMAT team arrives with further instruction. HAZMAT technician level EMS providers should consider the available and needed resources prior to entering a hazardous scene to ensure they have adequately trained back-up if needed.

III. SCENE SAFETY & SIZE-UP

When responding to a possible HAZMAT event the safety and security of first responders is a priority. It is important to stay upwind and uphill of all hazards when approaching the area and during staging prior to

entering the cold zone established by Hazmat Team. Safe distances for specific chemical may be determined from the Department of Transportation's *North American Emergency Response Guidebook.*

Initial Notification

Providers should communicate with Dispatch prior to arrival to identify a safe route to the scene and staging location. Necessary information to facilitate safe entry includes:

a. Estimated number of victims or potential victims

b. Urgency of the incident

c. Approach to the incident (i.e. Ingress and egress)

d. Location of the staging area

e. Identification (radio designation) of the Incident Commander

f. Hazardous substance involved

g. Request for specialized equipment needed

Scene Arrival

Initial evaluation includes (1) establishment and activation of an incident command/management system, (2) confirmation of scene security via perimeter and crowd control, and (3) activation of the appropriate guidelines for treatment, including a possible MCI or terrorist response.

Responders First On-Scene

The first arriving paramedic on scene should act as EMS Incident Commander (IC) until relieved by a higher ranking personnel capable of assuming command. The EMS Incident Commander is expected to:

a. Confirm the location of the staging area with the Fire Department on scene and notify dispatch.

b. Confirm the following information from the HAZMAT Team IC:
   - Specific chemical involved
   - Chemical state (liquid, gas, solid) and amount
   - Type/level of PPE required
   - Number of victims involved - if there are > 5-10 Red (Immediate) and/or 10^{+} (Yellow) or Green (Minor) patients, providers should activate the Mass Casualty Incident (MCI) plan if they anticipate rapidly exhausting available EMS resources.

c. Notify EMS Dispatch of:
   - Description of hazard
   - Number of patients
   - Risks to providers en route (e.g. necessary PPE, concern for nerve agent exposure)
   - Any other pertinent information relative to hospital needs (e.g. concomitant trauma or burns, decontamination capability of receiving facility)

All Other Responders

If the scene has not been secured and a staging area has not been established, the ambulance unit should make radio contact with the Incident Commander for staging instructions. Once the scene has been secured, the first-in ambulance unit should enter the staging area and report to the Incident Commander for further instructions.

In addition to providing patient care, qualified EMS personnel may be asked to assume any of the following roles: Safety Officer, EMS Section Officer (e.g. Triage, Treatment, Transportation, Communications), Rehabilitation Officer, or Public Information Officer.

In the absence of an Incident Commander and/or a staging area, EMS personnel should avoid entering the contaminated area.

Levels of PPE[1]

Personal protective equipment is divided into four categories based on the degree of protection afforded. Level B protection is the minimum level recommended on initial site entries until the hazards have been further identified and defined. Most EMS providers without additional Hazmat/Rescue training are equipped with Level C or Level D protection.

- **Level A protection should be worn when the highest level of respiratory, skin, eye and mucous membrane protection is needed**. A typical Level A ensemble includes:
    - Positive pressure (pressure demand), self-contained breathing apparatus (SCBA) (NIOSH approved), or positive pressure supplied air respirator with escape SCBA.
    - Fully encapsulating chemical protective suit.
    - Gloves, inner, chemical resistant.
    - Gloves, outer, chemical resistant.
    - Boots, chemical resistant, steel toe and shank; (depending on suit boot construction, worn over or under suit boot.)

- **Level B protection should be selected when the highest level of respiratory protection is needed, but a lesser level of skin and eye protection is needed.** A typical Level B ensemble includes:
    - Positive-pressure (pressure-demand), self-contained breathing apparatus (NIOSH approved), or positive-pressure supplied air respirator with escape SCBA.
    - Chemical resistant clothing (overalls and long-sleeved jacket, coveralls, hooded two-piece chemical splash suit, disposable chemical resistant coveralls.)
    - Gloves, outer, chemical resistant.
    - Gloves, inner, chemical resistant.
    - Boots, outer, chemical resistant, steel toe and shank.

- **Level C protection should be selected when the type of airborne substance is known, concentration measured, criteria for using air-purifying respirators met, and skin and eye exposure is unlikely.** Level C provides the same skin protection as Level B but a lower level of respiratory protection. A typical Level C ensemble includes:
    - Full-face or half-mask, air-purifying respirator (NIOSH approved).
    - Chemical resistant clothing (one-piece coverall, hooded two-piece chemical splash suit, chemical resistant hood and apron, disposable chemical resistant coveralls.)
    - Gloves, outer, chemical resistant.

[1] US Department of Health & Human Services. https://chemm.nlm.nih.gov/ppe.htm#levels

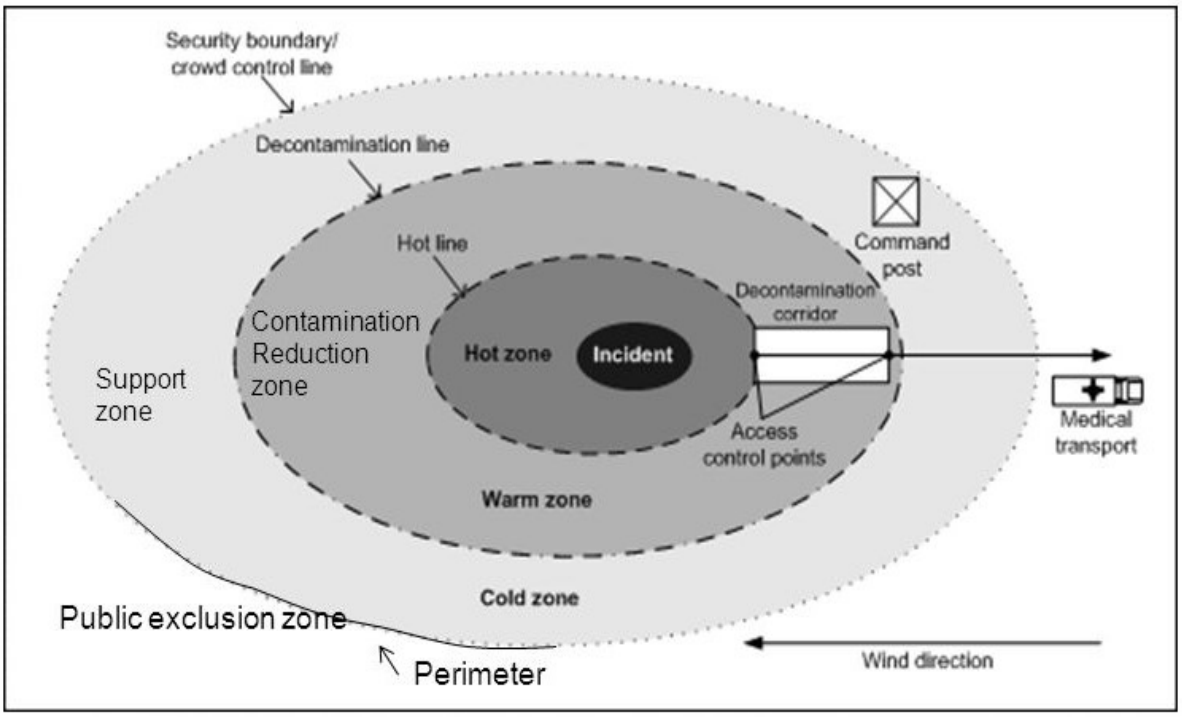
- Gloves, inner, chemical resistant.
- Boots, steel toe and shank, chemical resistant.

- **Level D protection is primarily a work uniform and is used for nuisance contamination only**. It requires only coveralls and safety shoes/boots. Level D provides no respiratory protection and minimal skin protection. Other PPE is based upon the situation (types of gloves, etc.). It should not be worn on any site where respiratory or skin hazards exist.

The EMS Incident Commander should confirm with the Hazmat IC what level of PPE is needed within each zone of care; this will vary based upon the situation and agent.

IV. ZONES OF CARE[23]

Zones of care delineate locations that require different levels of care and/or safety. Operationally, these zones help define the personnel and equipment that can and should be used depending on the type of incident. EMS zones are dynamic and fluid. Safety is paramount and the goal is to effectively transition the patients from the location of potential harm to definitive care.



Hot (Exclusion) Zone: The area of the EMS scene considered to be contaminated (actually or potentially) and having the highest potential for exposure. No responder should enter the hot zone without adequate PPE. The hot zone is maintained by a perimeter (aka "hot line") and should encompass all known or suspected hazardous materials.

Warm (Contamination Reduction) Zone: The area of the EMS scene that transitions between the hot and cold zone. This is the area where decontamination occurs, including decontamination of first responders entering

2 StatPearls [Internet]. www.ncbi.nlm.nih.gov/books/NBK436017/

[3] EMRA EMS Essentials. www.emra.org/books/emra-ems-essentials/chapter-7-haz-mat/

and exiting the hot zone. Initial triage also takes place in the warm zone. This intermediate zone of protection is determined by the length of the decontamination corridor which contains all of the needed decontamination stations.

Cold (Support) Zone: The area of the EMS scene determined to be free of all hazardous materials and contamination, including discarded protective clothing and respiratory equipment. The command post, planning, and staging areas should be located in the cold zone, upwind and uphill of the red zone.

Ensure that personnel assigned to operate within each zone have the proper level of PPE and training.

V. PATIENT DECONTAMINATION

Victims contaminated by a hazardous substance or radiation must be appropriately decontaminated by the HAZMAT Team prior to being moved to the triage area for transportation. Decontamination consist of two phases[4]:

(1) The Gross Decontamination phase occurs in the "hot" zone and includes the medical provider's primary assessment of ABCs, as well as the cutting away of clothing and jewelry once immediately life-threatening emergencies such as respiratory failure and hemorrhage are addressed. Open wounds should be cleaned and then covered with a water repellant dressing. The patient should then be rinsed with tepid water from head to toe.

(2) The Definitive Decontamination phase occurs in the "warm" zone and involves making the patient as clean as possible before transferring to the support zone and receiving facilities. Guidelines on duration of decontamination vary, but generally fall between 3-5 minutes, if not longer. If resources or time constraints do not allow for thorough cleansing, the patient should be cocooned in a blanket or sheet prior to transfer.

Transfer of the patient from the Hot Zone to the Cold Zone must be carefully coordinated to prevent the spread of contamination. The urgency of the situation should not change the handling of the contaminated personnel or equipment.

The removal of clothing and shoes will reduce external contamination by 70-90%. Thorough washing with soap and water will provide over 95% decontamination. Contaminated clothing and personal articles should be properly prepared for disposal by the HAZMAT Team. Double bagging removed clothing is ideal.

Decontamination Procedure

1. HAZMAT Team IC will establish hot, warm, and cold zones of operation.
2. HAZMAT and EMS Incident Commanders will ensure that personnel assigned to operate within each zone have proper PPE and training.
3. In coordination with other public safety personnel, EMS providers will ensure that each patient from the hot zone undergoes appropriate initial decontamination specific to the exposure. Only immediate life threats (i.e. ABCs) should be addressed by hot/warm zone providers at the same time as the initial (i.e. gross, high volume rinse) decontamination is occurring.

4. Further/repeat triage for treatment and transport may occur in the cold zone after secondary decontamination (i.e. thorough washing). In the event of an MCI, providers should place triage identification tags on each patient.
5. If patient personal belongings removed during decontamination are not disposed of by the Hazmat Team, providers should attempt to match patient belongings with the tag/triage information. Personal belongs should then be preserved for law enforcement. This should include all jewelry, cellular phones, clothing, etc.
6. EMS providers should ensure patient is grossly/initially decontaminated prior to being placed in an EMS unit for evaluation or transport.
7. EMS providers should monitor all patients for environmental illness (e.g. hypo- or hyperthermia)
8. Transport patients per ROPE guideline – consider MCI activation for major incidents.
9. Notify receiving facility as early as possible to allow for emergency department preparations.

VI. PATIENT CARE[5,6]

General Care

EMS treatment of the Hazmat patient is no different from standard patients, with the exception of the provider protecting oneself from contamination. Some hazardous agents persist despite decontamination and require EMS providers to continue wearing PPE after patient decontamination and during patient transport. This should be clarified with the Hazmat IC prior to patient evaluation. Providers also should prepare for the potential of secondary contamination through body fluids, emesis, and/or belching in patients with a history of toxic ingestion.

As previously stated, life threats should be addressed during the primary survey concurrent to the initial decontamination process. The secondary survey occurs when time allows. Unless required by life threatening conditions, invasive procedures (e.g. IV injection, intubation) should be performed only in fully decontaminated areas because they may create a direct route for introducing hazardous material into the patient. Providers should remember to reassess the patient frequently because many chemicals have latent physiological effects.

Most contaminated patient can be handled with symptomatic care. However, antidote specific treatment is outlined in the following Hazmat guidelines.

Toxidromes

Occasionally patients will display a constellation of signs and symptoms that aid in the identification of a hazardous agent. More common toxidromes are opioids, sedatives hypnotics, and the sympathomimetic syndrome seen after stimulant use. Other toxidromes that should be recognized and potentially treated in the prehospital setting include (1) Calcium channel and Beta blocker overdose, (2) Na-channel blockade and (3) Acetylcholinesterase inhibition.

[5] EMRA EMS Essentials. www.emra.org/books/emra-ems-essentials/chapter-7-haz-mat/

[6] Centers for Disease Control and Prevention: Managing Hazardous Materials Incidents. https://www.atsdr.cdc.gov/mhmi-v1-3.pdf

Beta & Calcium-Channel Blocker Toxicity

Beta blockers and cardio selective calcium-channel blockers both block the heart's AV node and reduce the effects of adrenaline. Severe overdose can result in cardiovascular collapse. A single pill of either of these drugs can kill a toddler.

In therapeutic doses, beta and calcium-channel blocker reduce heart rate and blood pressure. Not surprisingly, early signs of their toxicity include bradycardia, AV heart block, and hypotension. Multiple drugs are frequently required for stabilization of these patients. Providers should give Crystalloid fluid boluses initially for hypotension. Atropine may be required if the patient is hypotensive and bradycardic, though it is likely to be less helpful in severe overdoses. In the case of calcium channel blocker overdose, the administration of IV Calcium can be used to treat fluid-resistant hypotension. Medical Control should be contacted for these orders. Glucagon use is controversial; its use for either overdose should be discussed in consultation with Medical Control.[7]

The presence of hyperglycemia (in a non-diabetic patient) can help differentiate calcium channel versus beta blocker toxicity. Calcium channel exist in the pancreas and become ineffective during overdose. There may be a relationship between the severity of the ingestion and the extent of the hyperglycemia. Seizures and coma are rare and usually signify the presence of a co-ingestant.

Propranolol is a unique beta-blocker whose toxicity presents more like a sodium channel blocker overdose and should be treated as such.

Sodium Channel Blocker Toxicity

Na-channel blockade may be seen with several prescription drugs (e.g. carbamazepine, lamotrigine, citalopram, flecainide) but is most attributed to tricyclic antidepressants. Cocaine also has Na-channel blocking effects. The **SALT** syndrome[8] is used to describe the common clinical features seen with Na-channel blockade:

Shock
Altered Mental Status
Long QRS (wide complex > 100ms)
Terminal R wave in lead aVR is prominent (other EKG findings include AV conduction blocks, VT, and VF)

If Na-channel blockade is suspected, EMS providers should anticipate the need for early airway management and treatment of shock, referring to those respective medical guidelines. Sodium bicarbonate is the mainstay of treatment for severe Na-channel blockade toxicity. Sodium bicarbonate should be given if a wide QRS, ventricular arrythmia, or shock is present - Medical Control should be contacted for this order. Sodium Bicarbonate is ineffective for managing agitation or seizures; benzodiazepines may also be needed.

[7] Life in the Fast Line. https://litfl.com/glucagon-as-an-antidote/
[8] Tarascon Adult Emergency Pocketbook, 4th Ed.

Cholinergic Crisis (Acetylcholinesterase Inhibitor – AChEi - Exposure)[9]

Organophosphate and carbamate insecticides inhibit acetylcholinesterase enzymes and increase acetylcholine concentration, leading to cholinergic crisis. **DUMBELS** is a common mnemonic used to describe the signs and symptoms of cholinergic crisis.

Patients can manifest any or all of the signs and symptoms based on the route of exposure, agent involved, and concentration of the agent:

Diarrhea
Urination
Miosis/**M**uscle weakness
Bronchospasm/**B**ronchorrhea/**B**radycardia (the killer B's)
Emesis
Lacrimation
Salivation/**S**weating

The ultimate cause of death with AChEi exposure is due to hypoxia/anoxia from pulmonary edema caused by profound bronchial secretions. The primary antidote for cholinergic crisis is atropine. Atropine should be administered liberally and repeatedly until the patient's secretions resolve and respiratory effort improves; ongoing treatment should not be based upon heart rate or pupillary response. Atropine doses over 20mg are sometimes necessary; the stock available to a single provider is usually not sufficient to fully treat the victim but it should be initiated and continued during transport.

Pralidoxime chloride (aka 2-PAM) is a secondary antidote that augments the effect of atropine. Pralidoxime should be used concurrently with atropine when available; generally, no more than 2-3 doses of pralidoxime is administered to an adult patient. Several commercially available antidote kits have autoinjectors that contain both atropine and pralidoxime. If using a dual antidote autoinjector, providers must calculate the amount pralidoxime administered each time to prevent pralidoxime overdoses while giving multiple rounds of atropine. Further guidance on treatment is outlined in the corresponding HAZMAT guideline.

Nerve Agents

Nerve agents also inhibit acetylcholinesterase enzymes and cause cholinergic crisis. However, unlike organophosphates and carbamates, nerve agents are not readily accessible to the general public, can be rapidly be fatal with any route of exposure, and are traditionally classified as weapons of mass destruction.

EMS providers should consider the confirmed or potential release of a nerve agent when responding to an unspecified incident or scene involving:

1. An unknown illness involving a potentially large number of patients
2. An explosion from an unknown source at an event where a large number of people are in attendance
3. An incident where the initial EMS responders on scene suddenly become symptomatic

[9] NAEMT. Nerve Agent Information for EMS and Hospitals. https://www.naemt.org/docs/default-source/ems-preparedness/nerve-agent-info-for-ems-hospitals_08-21-2018_final.pdf?sfvrsn=9710c892_0

A person potentially exposed to a nerve agent should be decontaminated whether they develop signs of acute illness or not. Nerve agents can persist in the environment and remain chemically toxic for a prolonged period.

In the event of a nerve agent release, mass medication distribution may be necessary for the treatment of illness. CHEMPACK is a federally owned cache of nerve agent antidotes managed by the Centers for Disease Control and Prevention (CDC) and reserved for larger events (where the nerve agent exposure will deplete the regional supply of antidotes). CHEMPACKS are placed in centralized locations for rapid deployment and usage[10] and contain enough antidote to treat over 500 patients. The use of CHEMPACK materials is for a life-saving measures only and should not be used prophylactically.

EMS providers should contact their IC and/or higher rank immediately if they suspect that a nerve agent is being used as a terrorist attack or for chemical warfare. Special operations and the FBI Field Office WMD Coordinator will be notified by the IC or Rank Command.

Asphyxia Agents[11]

Asphyxiants are any gas capable of causing death due to oxygen displacement. Asphyxiants are designated as either simple or chemical.

Simple Asphyxiants

Simple asphyxiants are gases that displace oxygen from the inspired air. Common simple asphyxiants are carbon dioxide (CO_2), nitrogen, helium, methane, ethane, and natural gas (e.g. propane, heptane). Simple asphyxiants are encountered when the environmental atmosphere becomes abnormally loaded with one of these gases at such high concentrations that they significantly or completely push the normal oxygen out. Simple asphyxiants have no inherent toxic or metabolic effects on the body's cells, other than causing hypoxia due to lack of oxygen.

The signs and symptoms of exposure to a simple asphyxiant depend on the specific agent involved and the relative concentration of the agent in the atmosphere (i.e., how severe the lack of atmospheric oxygen is). Patients will exhibit such classic signs of hypoxia as agitation, which may rapidly progress to unconsciousness and then cardiac arrest. If the simple asphyxiant is CO_2, patients may experience a narcotic-like sleepiness as the initial effect of exposure.

A key consideration concerning the effects of simple asphyxiants is water solubility. Materials with high water solubility react quickly with the moist membranes of the eyes and upper respiratory tract, causing irritation and burning in addition to coughing, wheezing and bronchospasm. Unless the patient has a pre-existing pulmonary condition (asthma, COPD), symptoms seen in mild to moderate exposure tend to improve with fresh air and good ventilation. Examples of highly water soluble asphyxiants include ammonia, hydrogen chloride, and formaldehyde.

Materials with low water solubility do not react readily with moist membranes of the upper respiratory tract and are able to pass more deeply into the lungs, causing direct lung injury. Patients exposed to low solubility asphyxiants often have mild or no upper respiratory symptoms for the first severe hours but slowly experience

[10] Medical Response to Terrorism. www.naemsp.org/medicalresponse/
[11] JEMS. https://www.jems.com/operations/ems-responds-toxic-inhalation/

lower respiratory complaints like dyspnea, wheezing, and hypoxia. In cases of severe exposure, non-cardiogenic pulmonary edema may develop up to 24 hours after the time of exposure. A patient may seem relatively stable then decompensate with respiratory failure due to acute lung injury. Examples of low water soluble asphyxiants are phosgene and fluorine.

Chlorine is a unique asphyxiant in that it has intermediate water solubility. Patents exposed to chlorine may have immediate irritation of the upper respiratory tract while also displaying signs and symptoms of respiratory distress, bronchial irritation, and pulmonary edema within 6-24 hours of higher exposures. In its gaseous form, chlorine is known as hydrogen chloride. When chlorine dissolves into water, hydrochloric acid is made. Liquified chlorine (aka hydrochloric acid) is a commonly used corrosive solution that can cause injuries similar to frostbite and severe burns with deep ulcerations. Providers exposed only to chlorine gas generally are not at great risk of secondary contamination; however, providers most recognize the significant risk involved in exposure to liquified chlorine.

The mainstay of simple asphyxiant management is gaining safe access to the patient, followed by high-concentration oxygen administration and cardiopulmonary support as indicated. Any significant exposure to a respiratory irritant needs to be evaluated at a medical facility.

Chemical Asphyxiants

Chemical asphyxiants are gases that interfere with oxygen delivery to the tissues or utilization of oxygen to produce energy. These include Carbon Monoxide (CO), Cyanide (HCN), and Hydrogen Sulfide (H_2S). Signs and symptoms of inhaled chemical asphyxiant exposure depend on which specific agent the patient has been exposed to. Symptoms can have a sudden or gradual, more insidious onset depending on the concentration and material to which a patient is exposed. HCN and H2S exposure tend to have a more rapid onset and progression of symptoms than CO.

Carbon monoxide affects oxygen delivery by displacing oxygen molecules bound to hemoglobin. The affinity of CO for hemoglobin is over 200x oxygen's affinity; the more CO binds to hemoglobin, the easier it becomes for more CO to bind. Bound carboxyhemoglobin not only blocks unbound oxygen from binding but also inhibits the release of bound oxygen meant to be delivered to tissues. Patients exposed to CO may present with a spectrum of symptoms ranging from nausea and confusion with mild intoxication to seizures and cardiac arrest with severe poisoning. When available, providers should affix a CO detector on their equipment bag prior to entering a scene to assist with detection of occult toxicity.

Cyanide interferes with oxygen utilization by blocking an enzyme necessary for the aerobic metabolism and production of ATP. This leads to lactate accumulation as a by-product anaerobic metabolism and the development of metabolic acidosis. The seriously poisoned HCN patient classically presents with unresponsiveness, hyperventilation, and hypotension without evidence of cyanosis.

Hydrogen sulfide is a direct neurotoxin rapidly absorbed by the lungs that produces rapid systemic effects. Patients will often report a distinctive rotten egg odor, followed by eye and upper airway irritation progressing quickly to altered mentation with shortness of breath, hemoptysis, and ultimately pulmonary edema. H_2S can

cause death after just a few breaths. It is commonly referred to as the "knock down" gas because it causes near immediate loss of consciousness with high concentrations.

Clinical guidelines for treatment of CO and CN poisoning are outlined in subsequent pages. Treatment for H_2S includes supportive care with high-concentration oxygen and endotracheal intubation, if indicated.

Off-gassing of exhaled HCN and H_2S from the patient's lungs may be significant enough to cause some level of toxicity to EMS providers. Proper PPE in addition to following the procedures outlined in Section VII: Patient Transportation will help prevent secondary contamination.

Riot Control Agents[12]

Riot control agents (sometimes referred to as "tear gas") are chemical compounds that temporarily make people unable to function by causing irritation to the eyes, mouth, throat, lungs, and skin. Symptoms begin within seconds of exposure, are self-limited and are best treated by removing the patient from ongoing exposure. Symptoms frequently decrease over time (15-45 minutes) after the exposure ends.

Persons exposed to riot control agents may experience some or all the following symptoms:

- Eyes: excessive tearing, burning, blurred vision, redness
- Nose: runny nose, burning, swelling
- Mouth: burning, irritation, difficulty swallowing, drooling
- Lungs: chest tightness, coughing, choking sensation, wheezing, shortness of breath
- Skins: burns, rash
- GI: nausea, vomiting

Toxicity from riot control agents is related to is related to concentration of the agent used and the duration of exposure (especially in a non-ventilated space). EMS providers should move affected individuals from the contaminated environment and into fresh air as early as possible. Additional prehospital care should be symptom-specific: the most pertinent clinical guidelines for treatment will usually be (a) **Routine HAZMAT Care**, (b) **Wheezing/Bronchospasm**, and (c) **Burn Care**.

Patients with pre-existing pulmonary conditions (e.g. asthma, COPD) may be prone to more severe respiratory effects. Providers should also look for traumatic injury if exposed individuals were in proximity to the device used to disperse the riot control agent (e.g. host/stream under pressure, grenade).

VII. PATIENT TRANSPORTATION

No contaminated personnel, patient or equipment will depart the scene without first going through decontamination. EMS has limited staffing, equipment, and ambulance resources and they must be protected.

[12] https://emergency.cdc.gov/agent/riotcontrol/factsheet.asp#:~:text=Riot%20control%20agents%20(sometimes%20referred,throat%2C%20lungs%2C%20and%20skin.

Patient handling should be limited to personnel required in treatment and patient movement. When able, the driver of the ambulance should not be involved in patient treatment or handling to prevent contamination of the driver compartment of the ambulance. No PPE should be worn within the driver compartment.

The Routine HAZMAT Care guideline should be followed to prevent secondary contamination of EMS providers. This includes (a) wrapping the patient in a sheet, (b) sealing the window between the patient and driver compartment of the ambulance, and (c) ventilating the patient compartment of the ambulance.

Units found to have been exposed to and contaminated by a hazardous substance or material should be promptly decontaminated.

As early as possible (ideally, prior to transportation of patients), the EMS provider should notify the receiving hospital of the following and ask for instructions for entering the hospital with a contaminated patient.

a. Number of victims
b. Materials causing contamination
c. Extent of contamination and whether field decontamination occurred
d. Extent of injuries
e. ETA
f. Any other pertinent information

VIII. ARRIVAL AT THE EMERGENCY DEPARTMENT

Upon arrival at the hospital, emergency room personnel should meet the patient at the ambulance in order to determine if further decontamination is needed prior to delivery of patient(s) into the emergency room. All hospitals are expected to have a plan for receiving contaminated patients and mass contaminated casualties.

IX. EMERGENCY PERSONNEL DECONTAMINATION

All EMS providers who contact and care for a contaminated patient(s) or contaminated material(s) must take immediate measures to ensure proper decontamination after patient handoff is complete. Recommended secondary decontamination of EMS providers includes taking a shower and changing clothes. Follow-up monitoring of all personnel shall be conducted as deemed necessary by the ED Physician / Medical Director.

Routine Hazmat Care

Only trained and department approved personnel should enter into warm zones

Possible Hazmat Threat Identified

When possible, notify dispatch of:

1. Location of Incident
2. Chemical(s) involved
3. Amount & state of chemical(s)
4. Number of victims
5. Wind direction and speed

Use binoculars to maintain a safe distance

Ensure Scene Safety

- Stay/Move upwind and uphill of all hazards
- Communicate with dispatch to notify Hazmat Team, if not already on scene
- Identify a safe route to the scene and staging area

Consider contacting **Poison Control** for additional information: 1-800-222-1222

Confirm with Hazmat Team the level of PPE required for EMS once the chemical(s) involved has been confirmed

Any patient that has made contact with a hazardous material and/or showing signs or symptoms of exposure must be immediately decontaminated by the local Hazmat Team prior to EMS evaluation

After Patient Has Been Decontaminated:

- Utilize START triage and place patient into appropriate priority group
- Treat (based on ROPE guidelines) according to hazard, level of exposure and signs and symptoms

Prior to Securing Patient on the Stretcher:

- Wrap patient in a sheet to prevent secondary contamination and hypothermia
- Leave patient's head exposed to maintain airway, breathing and circulation

Prior to Loading Patient:

- Consider taping plastic to seal the window between the patient and driving compartments
- Ventilate the patient compartment and set temperature to prevent hypothermia

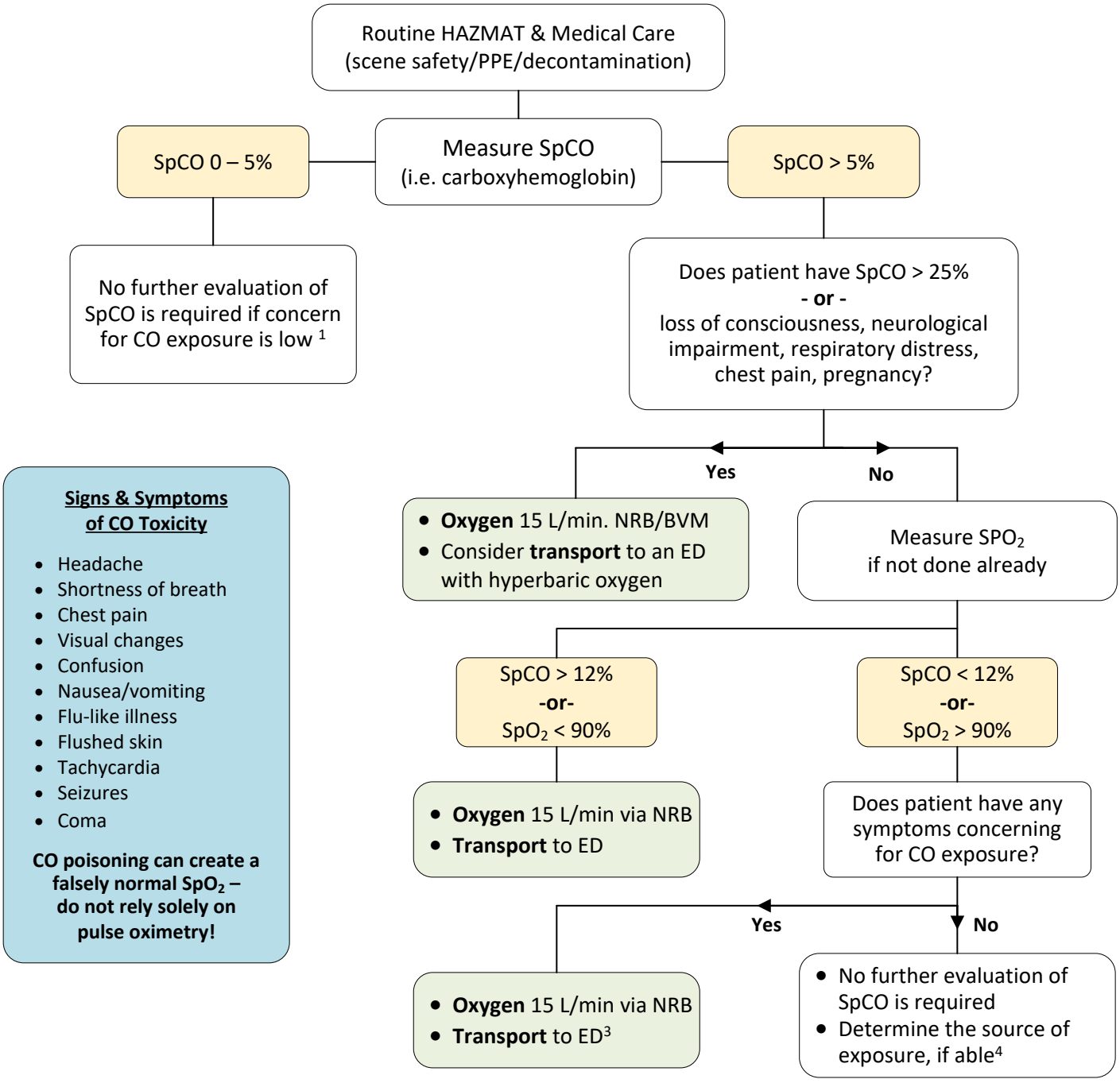
Prior to Transport:

Contact hospital(s) to determine decontamination capabilities and ability to receive patients

The primary role of EMS is medical triage, treatment and transport of patients and rehabilitation of first responders

- Assume all patients are potentially contaminated - use appropriate PPE and patient packaging techniques to prevent the transmission of contaminants.
- As soon as safe, remove the patient from the source and limit exposure – treatment and antidotes will not be effective while the patient remains exposed to the hazard.
- By removing all patient clothing (including undergarments) and grossly decontaminating a patient with water, 80% of the contaminants will be removed. Most of the remaining contaminants are found in the patient's hair.
- Patient belongings/clothing should not be transported by EMS. Contaminated items should be left on scene and evaluated for proper decontamination by the Hazmat Team.

Carbon Monoxide (CO) Exposure



- Chronic CO exposure is just as significant as acute poisoning but may have a gradual onset. Tobacco smokers have a higher baseline concentrations of carboxyhemoglobin and will reach toxic concentration earlier in any exposure. Recommend smoking cessation treatment for smokers.

[1] Absent or lower levels of COHb are not reliable, especially when your clinical suspicion for CO poisoning is high (e.g. firefighters, obvious inhalation of fire byproducts). Treat CO poisoning while also considering/treating other diagnoses.

[2] Fetal hemoglobin has a much higher affinity for CO than maternal hemoglobin. All females with known or suspected pregnancy should be advised that EMS-measured SpCO levels only detect adult COHb and their fetal COHb could be much higher. Recommend ED evaluation for any CO-exposed pregnant female.

[3] Subtle neurological findings may rapidly improve on Oxygen 15 L/min via NRB. The patient still requires an ED evaluation.

[4] CO poisoning is caused by inhaling combustion fumes. Common sources includes fire, gasoline, heating appliances in the home, and cigarettes. Always consider this diagnosis when multiple persons in the home present with the same suspicious symptoms.

Cyanide (HCN) Exposure

Consider treatment for any patient with altered mental status or unresponsive after smoke inhalation, fire, combustion, or after known exposure to cyanide compound

Signs and Symptoms of CN Toxicity

- Headache
- Shortness of breath
- Chest pain
- Dizziness
- Nausea/vomiting
- Flu-like illness
- Flushed skin
- Tachycardia
- Syncope

Severe Symptoms

- Altered mental status
- Seizures
- Cardiac arrest

Note: Symptoms of CO & CN toxicity are the same!
co-exposure can occur

Routine HAZMAT & Medical Care
(scene safety/PPE/decontamination)

Oxygen 15L/min via NRB or BVM

If altered mental status present:
refer to **Altered Mental Status** guideline
to consider all possible etiologies

Measure S_PCO
If SpCO Reading > 5%:
treat as per **Carbon Monoxide** guideline

Consider CN toxicity especially in patients whose burns do not explain how critical they are!

High suspicion of CN toxicity with severe symptoms?

No

- Continue **Oxygen** 15 L
- Monitor for deterioration

Yes

Hydroxocobalamin[1-4] (aka CYANOKIT®) over 15 min, if available

- Adults: 5g IV/IO
- Pediatrics: 70mg/kg IV/IO (max 5g)

If hypotension present:
treat as per **Shock** guideline

For severe cases and/or no improvement:
contact **Medical Control** for a second dose of **Hydroxycobalamin**[1-4] (aka CYANOKIT®) given over 15 min

- Adults: 5g IV/IO
- Pediatrics: 70mg/kg IV/IO (max 5g)

Cyanide poisoning can occur in spite of an oxygen rich environment – do not use SpO_2 to determine CN or CO toxicity.

[1] Hydroxcobalamin 5g vial is reconstituted with 200mL of 0.9% sodium chloride using the supplied transfer spike. The vial should be rocked, not shaken, for at least 60 seconds prior to infusion.

[2] Hydroxocobalamin must be administered independently of any other resuscitative medicines as it is incompatible with most standard ACLS medications. Establish a secondary means of vascular access.

[3] Begin CPR immediately if the patient is in cardiac arrest. Hydroxycobalamin can be administered during resuscitation.

[4] The dark red color of hydroxycobalamin causes discoloration of skin, mucous membranes, and bodily fluids. The pigment also may interfere with pulse oximetry. SpO_2 levels should not be relied upon after hydroxycobalamin is administered.

Nerve Agent | Organophosphate Poisoning

DUMBELS

Diarrhea
Urination
Miosis/**M**uscle Weakness
Bronchospasm/**B**ronchorrhea
Emesis & **B**radycardia
Lacrimation
Salivation/**S**weating

(miosis = pinpoint pupils)

Routine HAZMAT & Medical Care
(scene safety/PPE/decontamination)

Obtain history of AChEi exposure
and observe for toxidromic symptoms
(**DUMBELS** or **SLUDGE**)
* see HAZMAT preambles *

SLUDGE

Salivation
Lacrimation
Urination
Defecation
Gastrointestinal
Emesis

Evaluate severity of symptoms

Mild/Moderate Symptoms

- Visual disturbance
- Mild wheezing
- Chest tightness
- Salivation
- Lacrimation
- Sweating

Atropine Sulfate
q5min prn until secretions resolve – no max dose
Adults: 2mg IV/IO
Pediatric: 0.02mg/kg IV/IO

Pralidoxime Chloride (aka 2-PAM)
Adults: 1g IV/IO
Pediatric: 15mg/kg IV/IO (max 1g)

- Monitor for development of major symptoms
- Notify receiving hospital of possible AChEi exposure as early as possible

Major Symptoms

- Bradycardia
- Vomiting
- Respiratory distress/arrest
- Headache
- Seizures
- Altered mental status

DuoDote® Auto Injector (or Mark I® Kit)[1,2,3]
x 3 doses (RAPID)

Treat seizure activity
as per **Seizure** guideline[4]

Atropine Sulfate
q5min prn until secretions resolve – no max dose
Adults: 2mg IV/IO
Pediatric: 0.02mg/kg IV/IO

- Be prepared to assist patient ventilations
- Initiate cardiac monitoring, if available
- Document treatment on triage tag if MCI

[1] Each **DuoDote® autoinjector** contains **Atropine** 2.1mg + **Pralidoxime Chloride** 600mg. The Mark I Kit contains an atropine and pralidoxime autoinjector linked together with a plastic clip – the atropine should be administered first followed by the pralidoxime.

[2] Duodote autoinjectors should not be used for additional dosing of atropine beyond the recommended administered dose of pralidoxime.

[3] In the event of a large scale MCI, begin with 1 **DuoDote** if pt < 7 y/o, 2 **DuoDotes** if pt is 8-14 y/o and 3 **DuoDotes** if pt ≥ 15 y/o.

- If available for use, Pediatric AtroPens® can be used in place atropine vials:
  - Age 0-2 yo (<13kg): Mild/moderate symptoms: 0.05 mg/kg, Severe symptoms: 0.1mg/kg
  - Age 3-7 yo (13-25kg): Mild/moderate symptoms: 1mg, Severe symptoms: 2mg
  - Age 8-14 yo (26-50kg): Mild/moderate symptoms: 2mg, Severe symptoms: 4mg
- A pralidoxime 600mg autoinjector may be administered to an infant weighing greater than 12 kg.

[4] In the event of a large scale MCI, utilize **Diazepam autoinjector** 10mg for seizure activity as needed.

Hydrofluoric (HF) Acid Exposure

HF Signs & Symptoms

- Irritation/chemical burns (pain may be out of proportion to the apparent skin involvement)
- Chemical conjunctivitis
- Throat burning
- Stridor
- Wheezing
- Dyspnea
- Nausea/vomiting
- Abdominal pain
- Altered mental status
- Seizures
- Dysrhythmias
- Hypotension

Routine HAZMAT[1] & Medical Care including 12 lead EKG (scene safety/PPE/decontamination)

Obtain History of HF Exposure[2]

- Concentration of product
- Time of exposure
- Route of exposure (skin, ocular, inhalation, ingestion)

Give **Oxygen 15L** via NRB/BVM

If altered mental status present:

refer to **Altered Mental Status** guideline to consider all possible etiologies

To Make Calcium Gluconate Gel:

Mix 10mL of 10% Calcium Gluconate [not calcium chloride] into 5oz (150ml) of water soluble jelly (e.g. KY Jelly, Surgilube)

Commercially manufactured gel may also be utilized

Ocular Exposure

Irrigate eyes with 1L NaCl or H_20 (use Morgan lens, if available)

Inhalation Exposure[3]

- If bronchospasm present, treat as per **Wheezing/Bronchospasm** guideline
- If available, give 4ml of **nebulized Calcium Gluconate 2.5-5%**
- Anticipate the need for more aggressive airway management

Skin Exposure

- Copiously **Irrigate with NaCl or H_20** for a minimum of 15 minutes
- Apply **Calcium Gluconate gel 2.5%** transdermal to affected area[4]

- Apply cardiac monitor[5]
- Consider transport to a Burn Center based on size and location of injury – see **Burn Center Triage** guideline

[1] Assume that all patients are potentially contaminated and use appropriate PPE. **Responders must wear rubber (neoprene or polyvinyl chloride) gloves when treating HF to avoid hand burns from secondary contamination.**

[2] Hydrofluoric acid (HF) is primarily used for automotive cleaning products, rust removal, etching glass, or cleaning cement or brick. Injuries due to dilute or low concentration HF solutions may not present until days after the exposure.

[3] Given HF's high propensity for evaporation, inhalation injury should be considered in any dermal exposure involving the face or neck or if the patient's clothing is soaked in the product.

[4] Leave the gel in place for at least 20 minutes then reassess and repeat as needed if pain persist. In smaller burns, Calcium Gluconate gel can be massaged into the skin while flushing with water or saline. If fingers are involved, apply the gel to the hand, squirt additional gel into a surgical glove, and then insert the affected hand into the glove to keep the gel in place.

[5] Oral or large dermal HF exposure frequently result in significant hypocalcemia and cardiovascular collapse. If cardiac arrest develops, patients should be given IV Calcium Chloride to reverse hypocalcemia.

Irritant Gas | Simple Asphyxiant Exposure

Generally supportive therapy and respiratory support is the focus of care in these exposures as there are no specific antidotes.

Signs & Symptoms

- Irritation/chemical burns
- Chemical conjunctivitis
- Lacrimation, rhinorrhea
- Throat burning/irritation
- Coughing, choking
- Stridor
- Wheezing
- Dyspnea
- Pulmonary edema
- Nausea/vomiting
- Abdominal pain
- Headache
- Dizziness
- Altered mental status
- Seizures
- Dysrhythmias
- Syncope
- Hypotension
- Cardiac arrest

Severe respiratory distress may resemble cholinergic crisis due to profound secretions from pulmonary edema.

Remember, patients exposed to an irritant gas will have normal or dilated pupils, whereas nerve agent or organophosphate-exposed patients will have pinpoint pupils.

Routine HAZMAT Care
(scene safety/PPE/decontamination)

Routine Medical Care
including SpO_2, $EtCO_2$,
cardiac monitor, 12 Lead EKG

Obtain history of exposure, identify specific agent if able

For symptomatic patients:
Give **Oxygen 15L** via NRB/BVM

If altered mental status present:
refer to **Altered Mental Status** guideline
to consider all possible etiologies

If respiratory symptoms present:

- Give Albuterol/Atrovent as per **Wheezing** guideline
- If patient was exposed to chlorine, give nebulized **Sodium Bicarbonate 2.5ml** mixed in 2.5ml of sterile water
- Consider early CPAP with 5-10 cm H_20
- Prepare for aggressive airway management

- If hypotension present: treat as per **Shock** guideline
- If seizures present: treat as per **Seizure** guideline
- If dermal burns present: treat as per **Burn** guideline
- If severe pain present: treat as per **Traumatic Pain** guideline

If ocular injury present:
Irrigate eyes with 1L NaCl or H_20 (use Morgan lens, if available)

If there is any sort of suicide signage, hoses, or buckets of substance visible as you arrive – do not enter!

Immediately retreat to a well ventilated area and contact Dispatch for a HAZMAT Team

A supraglottic airway [SGA] should be considered as a last resort due to the irritant's potential to cause laryngeal edema

- Many irritant gases are heavier than air and will build up in low lying areas. Constantly reassess scene safety as the time of exposure increases. Assume that all patients are contaminated - use appropriate PPE and patient packaging techniques to prevent secondary contamination.
- A variety of gases may cause injury to multiple organ systems – the most significant of these is injuries to the upper and lower respiratory tract. Many airway/respiratory irritants have "warning properties" such as identifiable or unpleasant smells or irritation to eyes or airways.
- The most common exposures vary in their effect(s) based on their water solubility. Read more in the **HAZMAT Preambles.**
  - **Ammonia** is known for causing significant irritation to the eyes upper respiratory tract with minimal lower respiratory tract involvement.
  - **Phosgene** causes mild – if any – upper respiratory symptoms but patients may develop severe lower respiratory tract symptoms several hours after exposure due deep alveolar injury.
  - **Chlorine gas (aka hydrogen chloride)** can cause irritation and injury to be the upper and lower respiratory tracts. Liquefied chlorine (aka hydrochloric acid) can cause severe burns and dermal and ocular injuries similar to frostbite.

Radiation Exposure

The underlying principle of care involves management of injuries to skin and supportive care for additional injuries.
Treatment of life-threatening injuries or illness takes priority over assessment for contamination or initiation of decontamination.

Identify type/source of radioactive material[1]
Don PPE & limit exposure while waiting[2]

Treat life-threatening injuries
as per appropriate **Medical** or **Trauma** guideline

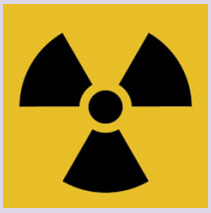
Routine Hazmat Care
if stable, decontaminate on-scene until a radiation detector indicates minimal residual radiation

Routine Medical and/or Trauma Care

Treat localized radiation injury
as per **Burn** guideline[3,4]

- Transport to a burn center that also has capability to treat radiation injuries
- Notify receiving ED staff as early as possible

Providers should suspect potential radioactivity on any scene they see the trefoil (the international radiation symbol)



A radiological survey conducted with specialized equipment is the only way to confirm exposure to radiation.

Consult with Dispatch and/or HAZMAT Team to determine if this has occurred.

[1] Common sources of radiation include industrial plants, nuclear power plants, healthcare facilities, WMD's, and "dirty bombs" - conventional explosives that contain radioactive material.

[2] Standard PPE including surgical facemask (N95 if available), outer garment protection, and gloves should be worn by first responders if available. Standard PPE protects the provider from secondary contamination but does not prevent direct exposure. Providers should limit the time they are exposed to a radiation source, maximize a distance from the source, and create a shield using physical barriers.

- It is important to differentiate irradiation from contamination. Irradiation (exposure) occurs when a person is near a radiation source. One does not have to come into contact with radiation materials to be exposed. Contamination occurs when radioactive material is physically present on or in the body. External contamination occurs when radioactive material is deposited on surfaces like skin or clothing. Internal contamination occurs when radioactive material is inhaled, ingested, or lodged in an open wound.
- Patients that have been exposed to radiation but are not contaminated with radioactive material do not need to be decontaminated. Irradiated patients pose no threat to medical providers. Contaminated patients pose little threat to providers who use appropriate PPE.

[3] Local Radiation injury (LRI)/burns can manifest as erythema, epilation (hair loss), ulceration, desquamation (scaling skin), or necrosis. LRI burns generally take longer to develop – sometimes days to weeks. Acute burns on a patient should be suspected to have a thermal or chemical component in addition to LRI and be treated as per the **Burn** guideline.

[4] Any patient with a local radiation injury is at risk of developing Acute Radiation Syndrome (ARS). ARS is caused by high doses of radiation. Symptoms (acute or delayed) may include nausea, vomiting, dizziness, loss of consciousness, hypotension/shock. Patients with this condition are not contagious.

- Providers should measure the length time between radiation exposure and onset of emesis. This time is a reliable indicator of the received dose of ionizing radiation. The more rapid the onset, the higher the whole body dose of radiation.

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Region One Protocol Effort

Advanced Practice Guidelines

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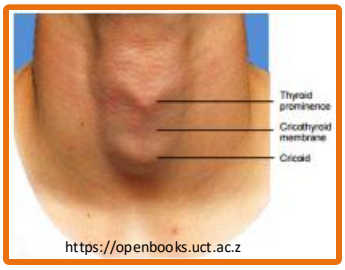
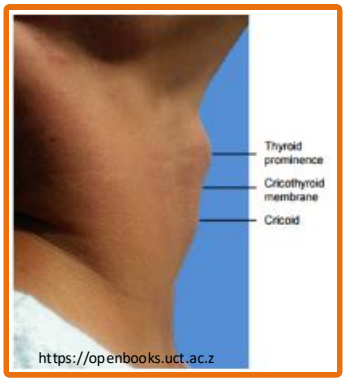
Cricothyrotomy

Paramedics MUST have written approval from their EMS Medical Director before using this guideline

When able, cricothryotomy should be formed by the qualified ALS provider that did NOT last attempt to intubate



- Team Leader says out loud to the team **"This is a Can't Oxygenate|Can't Intubate patient"** to ensure team moves toward SGA and preparation for cricothyroidotomy
- Team Leader confirms that ventilation is inadequate despite BVM and SGA (or SGA insertion is not possible due to upper airway obstruction)



- Remove pillows/blankets from under patient's head and neck
- Hyperextend patient's neck
- Palpate landmarks and identify cricothyroid membrane[1,2]

Perform surgical or large bore needle cricothyrotomy[3,4]
Utilize Control – Cric Kit if available

The agency Medical Director should be notified immediately upon completion of patient care whenever cricothyrotomy is performed

Trachea successfully intubated?

No → If needle cricothyrotomy was originally performed, provider may consider attempting surgical cricothyrotomy if previously trained and approved by their agency's Medical Director

Yes

- Secure ETT or cannula with neck tape
- Reconfirm placement by using continuous $ETCO_2$ capnography
- Proceed to guideline **Airway Management 3 of 3: Post-Intubation Airway Management**

[1] The thyroid prominence (aka Adam's apple) is more evident and easily palpated on some individuals than others. When one cannot easily find this landmark, the provider should use the "laryngeal handshake" method to palpate the entire laryngeal framework (thyroid + cricoid cartilage) instead of palpating with just the tips of their index fingers. With the laryngeal handshake method, the provider uses their whole hand to move the thyroid and cricoid cartilages side to side.

[2] If unable to palpate landmarks, providers performing a surgical cric should consider first making a vertical incision through the skin and dissecting with fingers on both hands to identify and stabilize the larynx prior to puncturing the cricothyroid membrane.

[3] Choice of needle versus surgical cricothyrotomy use should be determined in advance by the agency's Medical Director. Narrow bore or small cannula needle cricothryotomy (e.g. 12 or 14 g catheters with jet insufflation) is not recommended; however, large bore needles and catheters (4mm diameter or greater) allow for sufficient emergency oxygenation and ventilation. **Providers should not perform surgical cricothyrotomy on children less than 12 years of age.**

[4] Providers performing surgical cricothyrotomy should consider inserting a Bougie (similar to endotracheal intubation) to assist with proper tube placement.

Delayed & Rapid Sequence Intubation

Paramedics MUST have written approval from their respective EMS Medical Director before using this protocol.

DSI / RSI Indications:
- Patient unable to oxygenate or ventilate
- Patient unable to protect airway
- Impending airway compromise

Two Paramedics On Scene
- Obtain IV access (preferably two sites)
- Prepare for continuous VS monitoring (SpO2, EtCO2, BP, HR, EKG) and ensure visibility of all monitoring devices

DSI/RSI Contraindications
- Only one ALS provider on-scene
- EMS provider doubts they will be able to successfully secure the patient's airway

[1]**S**igns of **D**ifficult **A**irway **D**entition **D**isproportion **D**istortion **D**ysmobility (see **Medical Preambles**)

ONLY if performing Delayed Sequence Intubation
Administer **Ketamine**[1]
2 mg/kg IV/IO via slow push

- Preoxygenate with 100% **Oxygen** (see **Medical Preambles**)
- Treat hypotension with **Crystalloid Fluid** bolus and/or
- **Vasopressor Infusion** or **Push Dose Epinephrine**
- **Ondansetron** 4mg IV/IO if time permits

[1]Ketamine/DSI is ideal when patients are too agitated/ anxious to tolerate preoxygenation.

Choose RSI instead if preoxygenation can be achieved without sedation.

Ketamine may cause myocardial depression and cardiac arrest in severely shocked patients. Consider RSI or administer hypotensive doses of Ketamine if using DSI.

- Initiate apneic oxygenation @ 15L via NC (see **Medical Preambles**)
- Assess airway[1] with 4 D s – don t forget dentures!
- Position patient so their ear aligns with their sternal notch
- Assemble airway equipment, including backup tools (e.g. SGA, Bougie, cricothyrotomy kit)
- Verbalize failed airway plan to team

ONLY if performing Rapid Sequence Intubation
Administer sedative agent:
Ketamine[1] 2mg/kg IV/IO

Hypotensive Doses:
Etomidate 0.15mg/kg
Ketamine 0.5mg/kg
Succinylcholine 2mg/kg
Rocuronium 1.6mg/kg

Succinylcholine Contraindications
- CVA or spinal cord injury within the last 6 months
- Chronic renal failure on dialysis
- Suspicion of hyperkalemia
- Known or suspected muscular disease (e.g ALS, muscular dystrophy, myasthenia gravis, Guillain-Barre syndrome)
- History of malignant hyperthermia

Rocuronium Contraindications
- Known hypersensitivity to the drug

Administer paralytic agent:
Succinylcholine 2mg/kg IV/IO
Or
Rocuronium 1.2mg/kg IV/IO

Trachea Successfully Intubated

No
- Optimize SpO2 via BVM
- Reattempt intubation x 1
- Utilize failed airway plan & proceed to guideline **Airway Management 3 of 3: Can t Ventilate & Can t Intubate**

Yes
- Secure ETT with commercial ETT restraint device and document depth of ETT at level of patient's incisors
- Reconfirm ETT placement by using continuous ETCO2 capnography Measure and apply cervical collar to patient
- Proceed to guideline **Airway Management 3 of 3: Post-Intubation Airway Management**

Opioid Withdrawal | Buprenorphine Administration

Assess Opioid Withdrawal Sign & Symptoms

Objective Signs:
- Tachycardia
- Diaphoresis
- Restlessness and / or agitation
- Dilated Pupils
- Rhinorrhea [runny nose] or lacrimation [tearing]
- Vomiting
- Diarrhea
- Yawning
- Piloerection [Goose-Bumps]

Subjective Signs:
- Nausea
- Stomach / Abdominal Cramps
- Body Aches
- Achy bone / joints
- Restlessness
- Hot and Cold
- Nasal congestion

Signs or Symptoms Present

Assess for Exclusion Criteria

- 16 years of age or OLDER
- Any methadone use withing last 10 days
- Unable to give consent or comprehend potential risk and benefits [Altered Mental Status]
- Severe medical illness [Sepsis, respiratory distress, etc]
- Current intoxication or recent use of benzodiazepine, alcohol or other intoxicants suspected
- No clinical opioid use disorder symptoms

No

Yes

COWS ≥ 7
Clinical Opioid Withdrawal Scale

No

Not eligible for prehospital treatment

Yes

- Provide supportive treatment and counseling
- Assess patient interest in buprenorphine

Pt Agrees to Treatment

Pt Denies Treatment

Recommend Transport to University Medical Center (UMC) Emergency Room for evaluation

If Patient Declines Transport

Verify patient contact information
- Obtain necessary signatures / paperwork for AMA
- Document AMA via radio
- Provide Naloxone Kit and treatment brochure to patient
- Advise patient to dial 911 if needed
- Inform the patient that the Treatment Center staff will initiate contact within 72 hours to offer additional treatment.

1. Give water if available
2. Administer 8 **mg Buprenorphine SL**
3. Reassess after 10 minutes

If Symptoms Improve

If Symptoms Worsen or Persist

1. Re-Dose with **8 mg Buprenorphine SL**
2. **TOTAL MAX DOSE 16 mg SL during encounter.**

Clinical Opiate Withdrawal Scale (COWS)

Flow-sheet for measuring symptoms for opiate withdrawals over a period of time.

For each item, write in the number that best describes the patient's signs or symptom.

Note: Rate on just the apparent relationship to opiate withdrawal.

For example, if heart rate is increased because the patient was jogging just prior to assessment, the increase pulse rate would not add to the score.

Resting Pulse Rate: (record beats per minute) _____ *Measured after patient is sitting or lying for one minute* **0** pulse rate 80 or below **1** pulse rate 81-100 **2** pulse rate 101-120 **4** pulse rate greater than 120	
Sweating: *over past ½ hour not accounted for by room temperature or patient activity.* **0** no report of chills or flushing **1** subjective report of chills or flushing **2** flushed or observable moistness on face **3** beads of sweat on brow or face **4** sweat streaming off face	
Restlessness: *Observation during assessment* **0** able to sit still **1** reports difficulty sitting still, but is able to do so **3** frequent shifting or extraneous movements of legs/arms **5** Unable to sit still for more than a few seconds	
Pupil size **0** pupils pinned or normal size for room light **1** pupils possibly larger than normal for room light **2** pupils moderately dilated **5** pupils so dilated that only the rim of the iris is visible	
Bone or Joint aches *If patient was having pain previously, only the additional component attributed to opiates withdrawal is scored* **0** not present **1** mild diffuse discomfort **2** patient reports severe diffuse aching of joints/muscles **4** patient is rubbing joints or muscles and is unable to sit still because of discomfort	
Runny nose or tearing *Not accounted for by cold symptoms or allergies* **0** not present **1** nasal stuffiness or unusually moist eyes **2** nose running or tearing **4** nose constantly running or tears streaming down cheeks	

GI Upset: *over last ½ hour* **0** no GI symptoms **1** stomach cramps **2** nausea or loose stool **3** vomiting or diarrhea **5** Multiple episodes of diarrhea or vomiting	
Tremor: *observation of outstretched hands* **0** No tremor **1** tremor can be felt, but not observed **2** slight tremor observable **4** gross tremor or muscle twitching	
Yawning: *Observation during assessment* **0** no yawning **1** yawning once or twice during assessment **2** yawning three or more times during assessment **4** yawning several times/minute	
Anxiety or Irritability **0** none **1** patient reports increasing irritability or anxiousness **2** patient obviously irritable anxious **4** patient so irritable or anxious that participation in the assessment is difficult	
Gooseflesh skin **0** skin is smooth **3** piloerection [Goosebumps] of skin can be felt or hairs standing up on arms **5** prominent piloerection [Goosebumps]	
Total scores	

Score:

5-12 = Mild
13-24 = Moderate
25-36 = Moderately Severe
more than 36 = Severe Withdrawal

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Region One Protocol Effort

Appendix

March 2024

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Appendix I: Prehospital Radio/Phone Report

- This Is [EMS Department / Service Name]
- Unit # _____
- Skill level treating the patient
- Parish or Origin
- ETA
- Patient s Age
- History of present illness (CC) and duration of illness

  Relay major pertinent injuries
- Patient s LOC and GCS
- Vital Signs
  - Blood pressure
  - Pulse
  - Respiratory Rate, Quality & Breath Sounds
  - SpO_2 (Including O_2 device and rate)
- Pertinent medical history _____
- Treatment rendered and impact of treatment (response to treatment)

Appendix II: Trauma Radio/Phone Report

This Is (Service Name) _____(Unit #)_____Service Level_____Parish_____

Age_____

Mechanism of Injury / M.O.I _____

Meets Trauma Center Criteria (Anatomic, Physiologic, Mechanism) by _____

GCS _____

Vitals: Airway Status / O_2 Device_____B/P_____HR_____Resp. Rate_____SpO_2_____

Treatment rendered and Impact of treatment (physical exam improvement)_____

Scene Delays due to extrication, traffic, Etc._____ E.T.A._____

Region One Trauma Center Criteria

Physiological:

- Glasgow Coma Scale <14
- SBP <90 mm/Hg (<60 in peds.)
- Respiratory Rate <10 or>29/min or need for ventilatory support
- Respiratory Rate <20 in infant less than 1 year or need for ventilatory support
- Revised Trauma Score < 11
- Pediatric Trauma Score < 9

Anatomic:

- Penetrating injuries to the head, neck torso or extremities proximal to the elbow and knee.
- Flail chest
- Two or more proximal long bone fractures
- Crushed, degloved or mangled extremity
- Amputation proximal to the wrist or ankle
- Pelvic fractures
- Open or depressed skull fracture
- Paralysis
- Combination of mechanism of trauma associated with burns
- Blunt abdominal injury with firm or distended abdomen or with seatbelt sign

Special Considerations:

- SBP <110 in adult >65 y/o
- EMS provider judgment

Mechanism of Injury Criteria:

- Fall:
  - Adults --+ > 20 feet (one story is equal to 10 feet)
  - Pediatric --+ > 10 feet or 2-3 times the height of the child

- High Risk Auto Crash:
  - Intrusion (including roof) --+ > 12 inches into occupant site; > 18 inches any site
  - Ejection (partial or complete) from automobile
  - Death in same passenger compartment
  - Vehicle telemetry data consistent with high risk injury
- Auto vs pedestrian/bicyclist/ATV thrown, run over or with significant (> 20 mph) impact
- Motorcycle crash > 20 mph
- Head trauma on anticoagulant (exclude ASA) or history of bleeding disorder
- Blast or explosion
- High – energy electrical injury
- Hanging

Table 1 Vision, aphasia, neglect emergent large vessel occlusion screening tool

Stroke VAN	
How weak is the patient? Raise both arms	☐ Mild (minor drift) ☐ Moderate (severe drift - touches or nearly touches ground) ☐ Severe (flaccid or no antigravity) ☐ Patient shows no weakness. Patient is VAN negative
(exceptions are confused or comatose patients with dizziness, focal findings, or no reason for their altered mental status then basilar artery thrombus must be considered; CTA is warranted)	
Visual disturbance	☐ Field cut (which side) (4 quadrants) ☐ Double vision (ask patient to look to right then left; evaluate for uneven eyes) ☐ Blind new onset ☐ None
Aphasia	☐ Expressive (inability to speak or paraphasic errors); do not count slurring of words (repeat and name 2 objects) ☐ Receptive (not understanding or following commands) (close eyes, make fist) ☐ Mixed ☐ None
Neglect	☐ Forced gaze or inability to track to one side ☐ Unable to feel both sides at the same time, or unable to identify own arm ☐ Ignoring one side ☐ None

Patient must have weakness plus one or all of the V, A, or N to be VAN positive. VAN positive patients had 100% sensitivity, 90% specificity, positive predictive value 74%, and negative predictive value 100% for detecting large vessel occlusion.
CTA, CT angiography; VAN, vision, aphasia, and neglect.

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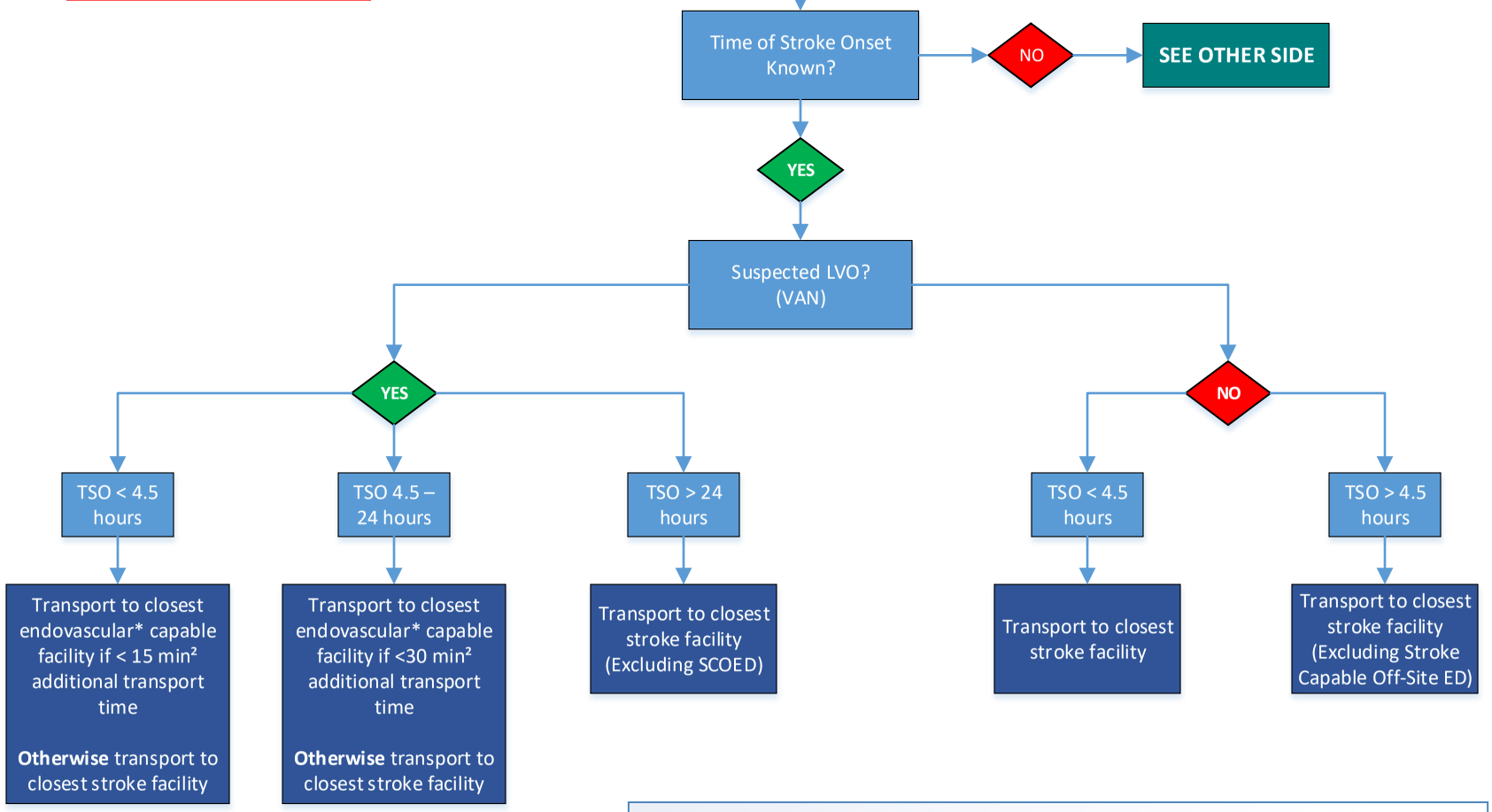
STROKE DESTINATION PROTOCOL

Time of Onset Known

SUSPECTED STROKE:
- Determine TSO: TIME OF STROKE ONSET[1]
- Determine LSN: LAST SEEN NORMAL[1]
- Determine TSN: TIME SYMPTOMS NOTED[1]
- Perform VAN assessment

LERN Communication Center
1-866-320-8293



Guiding Principles:
[1] When stroke is witnessed TSO, LSN, and TSN are the same.
[2] Additional transport time is calculated by considering drive time from scene to each facility.

Stroke Facility Definitions: **Endovascular Capable*
*CSC: Comprehensive Stroke Center
*TSC: Thrombectomy Capable Stroke Center
*PSC-E: Primary Stroke Center with Endovascular (May not be 24/7. Contact LCC to verify)
PSC: Primary Stroke Center
ASRH: Acute Stroke Ready Hospital
SCOED: Stroke Capable Off Site ED

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STROKE DESTINATION PROTOCOL

Time of Onset Unknown

SUSPECTED STROKE:
- Determine TSO: TIME OF STROKE ONSET[1]
- Determine LSN: LAST SEEN NORMAL[1]
- Determine TSN: TIME SYMPTOMS NOTED[1]
- Perform VAN assessment

LERN Communication Center
1-866-320-8293

Time of Stroke Onset Known?[1]

YES → **SEE OTHER SIDE**

NO

Suspected LVO? (VAN)

YES

- LSN < 4.5 hours → Transport to closest endovascular* capable facility if < 15 min[2] additional transport time
  Otherwise transport to closest stroke facility
- LSN > 4.5 hours and TSN < 4.5 hours → Destination priority:
  1. Closest endovascular* capable facility if < 15 min[2] additional transport time
  2. Closest stroke facility with emergent MRI[3] capability if < 15 min[2] additional transport time
  3. Closest stroke capable facility
- TSN > 4.5 hours → Transport to closest endovascular* capable facility if < 15 min[2] additional transport time
  Otherwise transport to closest stroke facility

NO

- LSN < 4.5 hours → Transport to closest stroke facility
- LSN > 4.5 hours and TSN < 4.5 hours → Transport to closest stroke facility with emergent MRI[3] capability if < 15 min[2] additional transport time
  Otherwise transport to closest stroke facility
- TSN > 4.5 hours → Transport to closest stroke facility (Excluding SCOED)

Guiding Principles:

[1] When stroke is witnessed TSO, LSN, and TSN are the same.
[2] Additional transport time is calculated by considering drive time from scene to each facility.
[3] MRI 24/7 with tech call schedule for off hours and weekends

Stroke Facility Definitions: **Endovascular Capable*

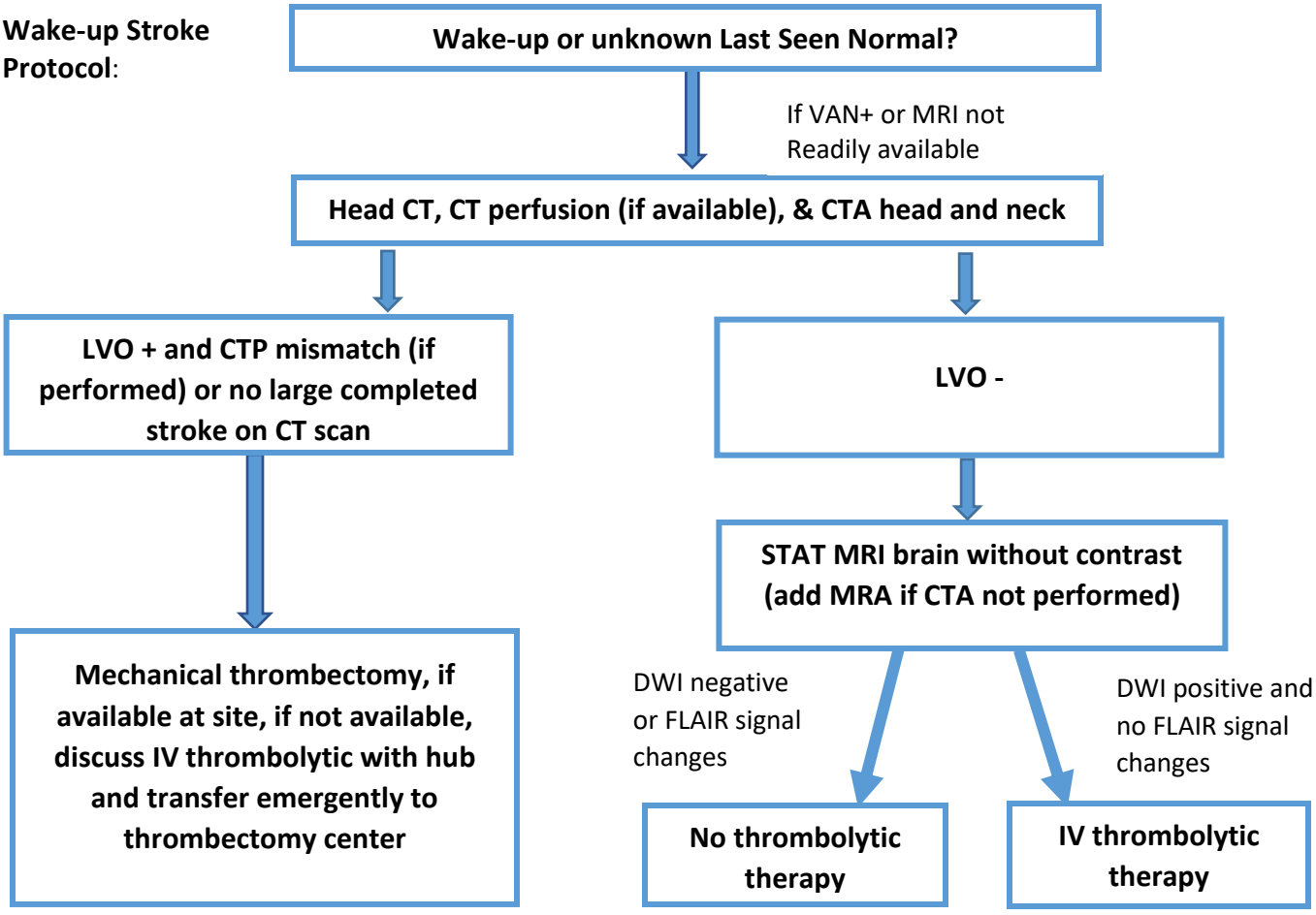
*CSC: Comprehensive Stroke Center
*TSC: Thrombectomy Capable Stroke Center
*PSC-E: Primary Stroke Center with Endovascular (May not be 24/7. Contact LCC to verify)
PSC: Primary Stroke Center
ASRH: Acute Stroke Ready Hospital
SCOED: Stroke Capable Off Site ED

WAKE-UP / UNKNOWN SYMPTOM ONSET STROKE GUIDELINE

Background

- About 20% of strokes are detected upon awakening. Historically, these patients were excluded from treatment with IV lytic due to being "out of the window" from last seen normal.
- Radiographic studies of patients with wake-up strokes support the onset is likely shortly upon awakening.
- A randomized controlled study demonstrated efficacy of IV lytic (alteplase) in improving the odds of an independent outcome when selected by MRI of the brain, performed within 4.5 hours of symptom detection. The number needed to treat was nine. The symptomatic hemorrhage rate was only 2.4%.
- Since 2019, our AHA/ASA Guidelines for the Emergency Management of Acute Ischemic Stroke issued a Class 11a, level of evidence B recommendation for IV alteplase (0.9mg/kg, maximum dose 90mg) within 4.5 hours of symptom detection for patients who have MRI confirmation of DWI lesion less than one-third of the MCA territory and no visible signal change on FLAIR. This applies to patients who are found with stroke symptoms whose last seen normal is more than 4.5 hours prior.

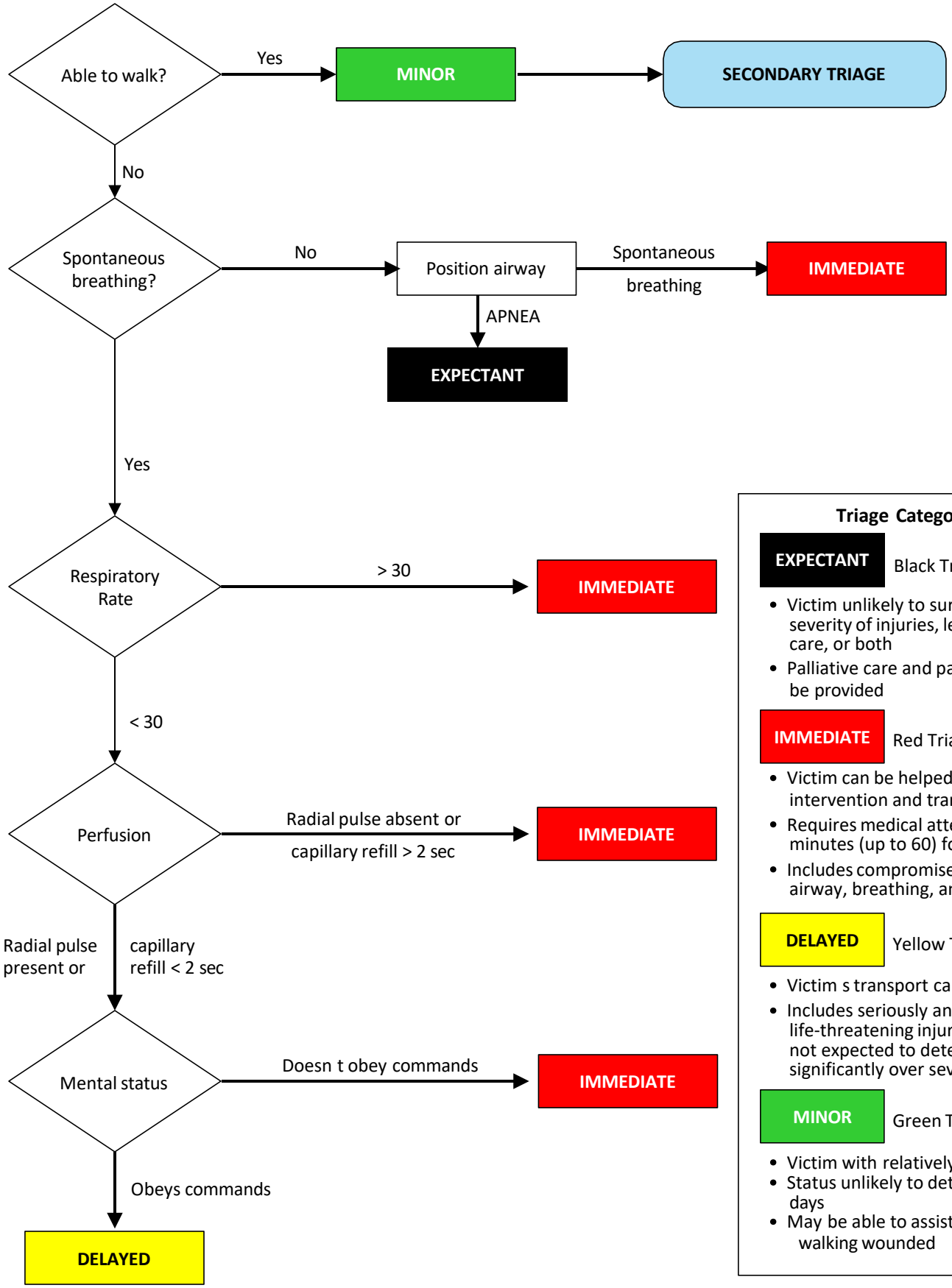
Wake-up Stroke Protocol:



- If your center does not have CT perfusion imaging and the patient has LVO, emergently transfer to a thrombectomy center.
- If your center does not have emergent MRI capability and the patient does not have LVO, emergently transfer to closest hospital with MRI capability, if feasible within 4.5 hours of symptom detection.

Appendix IV: START Adult Triage

S.T.A.R.T. = Simple Triage and Rapid Treatment
Remember RPM: Resiprations, Pulse, Mentation



Triage Categories

EXPECTANT Black Triage Tag Color

- Victim unlikely to survive given severity of injuries, level of available care, or both
- Palliative care and pain relief should be provided

IMMEDIATE Red Triage Tag Color

- Victim can be helped by immediate intervention and transport
- Requires medical attention within minutes (up to 60) for survival
- Includes compromises to patient s airway, breathing, and circulation

DELAYED Yellow Triage Tag Color

- Victim s transport can be delayed
- Includes seriously and potentially life-threatening injuries, but status not expected to deteriorate significantly over several hours

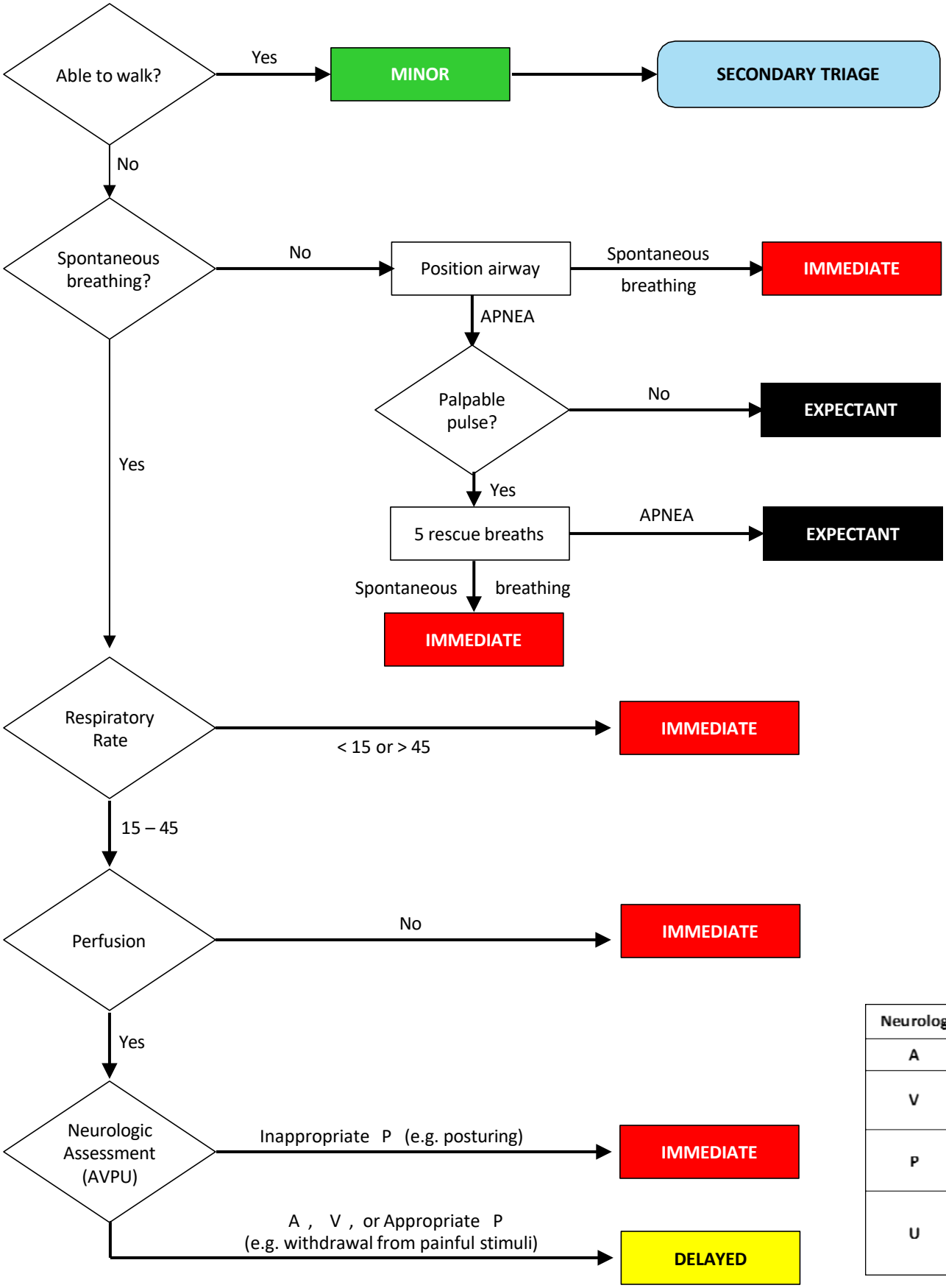
MINOR Green Triage Tag Color

- Victim with relatively minor injuries
- Status unlikely to deteriorate over days
- May be able to assist in own care: walking wounded

Appendix V: JumpSTART Pediatric Triage

The primary difference between JumpSTART & START is in Step 2 – using rescue breaths to make triage decisions

If a victim appears to be a child, use JumpSTART
If a victim appears to be a young adult, use START



Neurological Assessment	
A	Alert
V	Responds to Verbal Stimuli
P	Responds to Painful Stimuli
U	Unresponsive to Noxious Stimuli

Appendix VI: Helicopter Response Guidelines

Purpose

The helicopter is an air ambulance and an essential part of an EMS system. While Air Medical Services (AMS) are valuable, they are also a limited resource. It is important that Emergency Medical Service personnel utilize consistent and appropriate criteria when requesting AMS for patient care and transport.

This document does not require EMS activation of air medical services – it solely serves as a guide when requesting air medical support. Helicopter EMS must be fully integrated into the regional emergency healthcare systems in order to be both safe and effective.

Decision to Utilize Helicopter Response

The highest-skilled level EMS provider on-scene should determine the need for helicopter evacuation and follow his/her service's operational guidelines and protocols for making this request. A helicopter may be considered in situations where:

- Helicopter use will meaningfully shorten to time to delivery of definitive care (compared to ground EMS) to patients with time-sensitive conditions;
- Helicopter use will provide necessary specialized medical expertise or equipment to patients before and/or during transport; or
- Helicopter use will provide transport to patients inaccessible by other means of transport

Air medical services should not be deployed for the sole purpose of expediting care. Additionally, providers should consider the likelihood of whether a patient has a reasonable chance of survival when determining the appropriateness of flight transport.

Air Medical Services may be considered for the following criteria:

Operational Indications

- Extended ground transport time
- Prolonged extrication
- Remote areas or areas inaccessible by ground ambulance
- Mass casualty incidents or incidents involving multiple critical patients (i.e. the use of the existing ground transport services threatens to overwhelm the local EMS system)
- The nature of the emergency is such that the local hospital is not appropriate and transport by ground EMS to an appropriate facility is greater than 20-30 minutes.

Medical Indications (patient must be < 350 lbs.)

- Critically ill trauma, burn, stroke or STEMI patient(s)
- Patient(s) has respiratory compromise or requires rapid sequence intubation
- Patient(s) has a high-risk medical emergency after consultation with Medical Control

Emergent Request for Helicopter Response

The key to effectively utilizing AMS is to request helicopter response as early in the incident as possible. The responder on-scene should communicate the situation and the location to the air ambulance service; additionally, on-scene providers should offer recommendations for safe landing zones or intercept sites (see below). Agencies should ensure that on-scene personnel have access to the appropriate radio frequencies to communicate with air medical units.

Appendix VI: Helicopter Response Guidelines

Landing Zone Officer

On-scene EMS providers must designate a Landing Zone Officer (LZO) who has been appropriately trained and passed an air medical landing zone course. The LZO will advise the 911 dispatch center of their LZO designation as early as possible. The responsibility of the LZO is to act at the coordinator and primary communicator with 911 dispatch and the helicopter crew. Duties of the LZO include, but are not limited to, the following:

1) Identify a safe landing zone (LZ)
2) Provide the exact location of the desired LZ to the aircraft pilot (using GPS coordinates)
3) Verify correct marking of the landing zone
4) Advise 911 dispatch of the arrival and departure of the responding aircraft
5) Delegate other necessary duties within the landing zone (including a safety officer)

Safe Landing Zone

While the helicopter is en route, a landing zone must be selected and prepared. The helicopter crew will usually provide instructions outlining what they need for a safe landing zone. The landing zone should be as close to the scene as possible without jeopardizing the safety of the personnel on the ground. The landing zone should be free of debris such as gravel, litter, or any materials that may become deadly airborne projectiles if they are caught in the helicopter's main rotor. The landing zone should also allow the helicopter to approach and depart along a path that is free from obstructions such as trees, power lines, and light poles.

Landing Zones Requirements

- Area ideally measuring 100 ft x 300 ft (100x100 is needed for landing + 200x100 for safe approach and departure)
- Flat, firm ground with no more than a 3 inch slope for every 100 feet
- Clear of wire, debris, obstructions, unstable sheds, loose rooftops, people, and livestock
- Properly marked and free of moving vehicles or bystanders
- At least 1 mile upwind to any hazardous materials incidents

1st LZ choice: as close as safely possible to the incident
2nd LZ choice: between the incident and the specialized receiving hospital
3rd LZ choice: at a predesignated landing area in the community (e.g. football field, local hospital helipad)

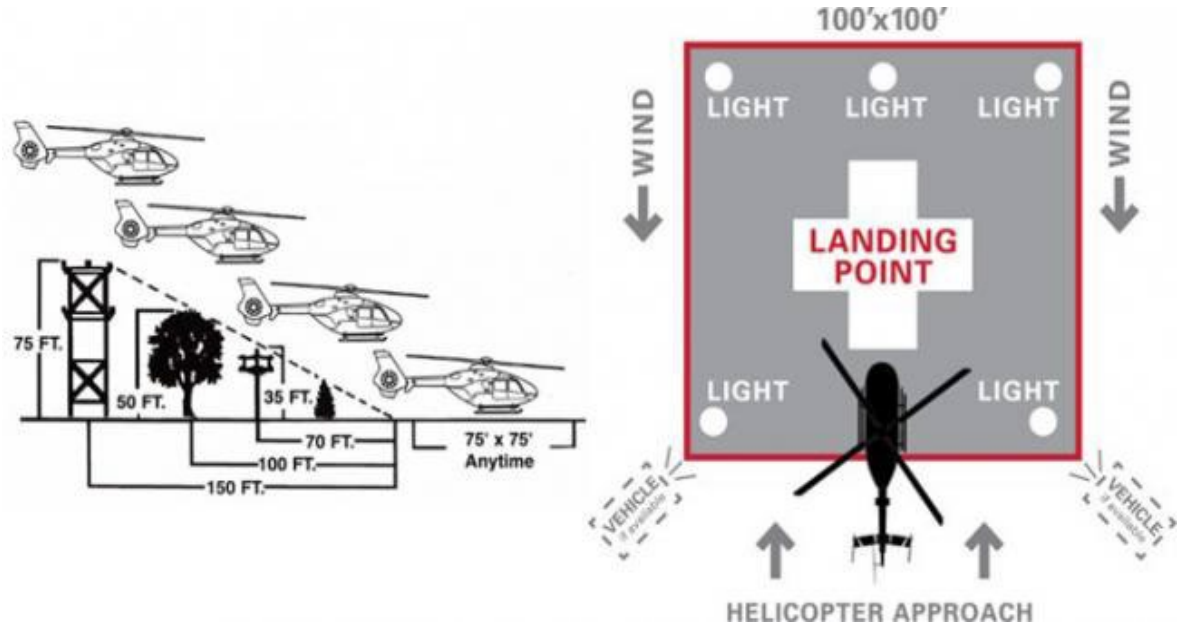
Marking the Landing Zone

- Mark the corners of the 100 ft x 100 ft touchdown area with steady vehicle headlights, box lights, or continuous burner amber-color lights. Red lights are preferred. Flashing lights are distracting.
- Direct light beams horizontally across the touchdown area.
- Mark any obstructions with red strobe or continuous burning lights.

The LZO, Safety Officer, or a designee should ensure that no vehicle traffic or non-essential personnel approach the landing zone unless instructed before, during, and after helicopter landing.

Appendix VI: Helicopter Response Guidelines

Helicopter Landing Zone



Normally a helicopter will land and take off into the wind. To assist the pilot in determining wind direction and speed at the landing zone, a bright streamer of flag can be securely attached to a whip antenna on the apparatus.

Landing Safety

Once hovering over the scene, the air ambulance provider should communicate over radio, notifying ground responders where the helicopter will be landed and providing any other instructions. The LZO should notify the pilot of ALL slopes and potential obstructions in the vicinity – when in doubt, point it out. The pilot is the final authority in accepting an area for landing. If the pilot is uncomfortable with the landing zone an alternate area should be identified.

The landing and takeoff phases of helicopter flight are most dangerous. In the event of a landing accident, all ground personnel should take cover because there will likely be significant flying debris.

Loading Procedure

Always approach the helicopter from the front. No one should approach the aircraft without permission from the flight crew. Providers must wear protective eyewear at all times and secure all loose personal objects. Do not raise hands, IV solution, or any other objects over shoulder height.

An EMS service should not wait on the scene or delay transport waiting for the helicopter to arrive. If the patient is packaged and ready for transport, the ground EMS service should initiate transport to the hospital and reassign a landing zone where the AMS crew can intercept patient care. If the helipad of a non-appropriate receiving hospital is utilized as a landing zone, the ground EMS crew should not wait more than 8 minutes for the aircraft before proceeding downstairs to the hospital's ED for patient stabilization.

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Region One Protocol Effort

Medications

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ADENOSINE

Additional Names: Adenocard, Adenoscan

Classification: Atrial antiarrhythmic, Endogenous nucleotide

Indications: Stable Narrow Complex Tachycardia, refractory to vagal maneuvers

Contraindications:
Known hypersensitivity
Bradycardias and AV blocks > than 1°
Sick-sinus syndrome

Dosages:

Adult:

Stable, Regular, Narrow-Complex Tachycardia
Initial: 6-12mg Rapid IV/IO push, followed by 20ml flush, q 1-2min
2nd: 12mg Rapid IV/IO push, followed by 20ml flush

Pediatric:

Probable SVT
Initial: 0.1mg/kg IV, q 1-2 min, max 6mg
2nd: Double first dose, max 12mg

Ventricular Tachycardia
If rhythm is regular and monomorphic:
Initial: 0.1mg/kg IV, q 1-2min, max 6mg
2nd: Double first dose, max 12mg

Side Effects: Transient periods of asystole/bradycardia/ventricular ectopy, hypotension, palpitations, chest pain, facial flushing, dyspnea, dizziness, tingling, or headache

Physiological : Effects Adenosine is an endogenous nucleotide, a derivative of Adenosine Triphosphate (ATP). Adenosine slows conduction time through the AV-node and can interrupt re-entry pathways through the AV-node, restoring sinus rhythms to patients experiencing SVTs. Adenosine half-life < 10 seconds. Onset is immediate.

Additional Info:
Vagal/Valsalva maneuvers/ice pack to face first, when clinically appropriate.
Large bore IV access (16g) should be obtained as proximal as possible.
Higher efficacy of conversion with use of stopcock and extremity elevation during administration. Follow with a rapid saline flush.
Does not convert Atrial Fibrillation, Atrial Flutter, or Ventricular Tachycardia.
Larger doses may be required for patients taking Theophylline or Caffeine.
Reduced doses may be required for patients taking Dipyridamole (Persantine) or Carbamazepine (Tegretol).

ALBUTEROL SULFATE

Additional Names:	Proventil, Ventolin, Salbutamol
Classification:	Beta Agonist, Bronchodilator (Sympathomimetic)
Indications:	Relief of bronchospasms Asthma COPD, chronic bronchitis, emphysema Suspected hyperkalemia
Contraindications:	Known hypersensitivity Symptomatic tachycardia (relative) Cardiovascular or Cerebrovascular Disease (relative) Congestive Heart Failure or Pulmonary Edema (relative) Use of beta-blocker medications (relative)
Dosages:	**Adult:** Wheezing/Bronchospasm 5mg Nebulized Mild: may repeat x 1 prn. Moderate: may repeat prn. Severe: may repeat prn Drowning If fluid is auscultated (i.e. rales) in the lungs 5mg Nebulized, q5min, may repeat x3 prn Crushing Injury/Syndrome Signs of hyperkalemia present 20mg Nebulized **Pediatric:** Asthma/Wheeze > 2 yo ≥ 4yo = 5mg Nebulized < 4yo = 2.5mg Nebulized May repeat x2 while administering other treatments. Continue DuoNeb's prn while enroute
Side Effects:	Tachycardia, palpitations, hypertension, angina, nervousness, tremors
Physiological: Effects	Beta-2 sympathomimetic that produces bronchodilatation by causing smooth muscle relaxation of the smooth bronchial muscles through the stimulation of the beta-2 receptors in the lung tissue.
Additional Info:	Use cautiously in patients with CAD, HTN, DM, hyperthyroidism.

AMIODARONE

Additional Names:	Cordarone, Nexterone
Classification:	Antiarrhythmic (Class III)
Indications:	Ventricular Tachycardia, Ventricular Fibrillation
Contraindications:	Known hypersensitivity Cardiogenic Shock Severe Sinus Bradycardia, AV Block without a functioning pacemaker B and Ca^{2+} Channel Blocker OD, with widened QT segment
Dosages:	**Adult:** Cardiac Arrest – VF/pVT Initial: 300mg IV/IO 2nd: 150mg IV/IO, ~~q~~ 3-5 minutes after 1st dose Post ROSC Loading Dose: 150mg IV/IO infusion over 10 minutes if two boluses (300 mg followed by 150 mg) were not already given during resuscitation Maintenance Infusion: 1mg/min IV/IO infusion Wide Complex Tachycardia Regular/Irregular Rhythm: Loading Dose: 150mg IV/IO infusion over 10 minutes Maintenance Infusion upon conversion: 1mg/min IV/IO infusion **Pediatric:** Cardiac Arrest – VF/pVT Initial: 5mg/kg IV/IO, max 300mg, may repeat bolus x2 prn, max 450mg total Ventricular Tachycardia If rhythm is regular and monomorphic: Initial: 0.1mg/kg IV, q 1-2min, max 6mg 2nd: Double first dose, max 12mg
Infusion Set-up:	**Loading Dose Infusion:** 150mg over 10min: Add 150mg Amiodarone to 150mL NS/D5W, using a 10 gtt/ml macro drip set, administer *2.5gtts/sec* (aka 150 gtt/min). If using a 15 gtt/ml macro drip set, administer *3.75 gtts/sec* (aka 225 gtt/min) **Maintenance Infusion:** 1mg/min: Add 150mg Amiodarone to 150 mL NS/D5W, using a 60 gtt/ml micro drip set, administer *1gtt/sec* (aka 60 gtt/min)
Side Effects:	Bradycardia, hypotension, Torsades de pointes (particularly with patients using beta blockers and/or digoxin)

AMIODARONE (continued)

Physiological: Effects	Amiodarone's main mechanism in addressing ventricular dysrhythmias is decreasing cardiac cell excitability by blocking potassium channels. Secondarily, it blocks Beta-1, sodium, and calcium channels which leads to decreased SA node automaticity, slowing movement through AV node and ectopic pacemaker. Amiodarone increases PR and QT intervals and decreases peripheral vascular resistance.
Additional Info:	While not a contraindication, Amiodarone should be administered with caution to patients with documented iodine allergy. Though rare, anaphylaxis can occur due to iodine in medication solution. Do not administer along with other medications that prolong QT intervals. Potentiates bradycardia / hypotension with β and Ca^{2+} Channel blockers. Increases the risk of AV block and hypotension with Ca^{2+} Channel blockers. Increases anticoagulation effects of Warfarin

ASPIRIN

Additional Names:	Acetylsalicylic Acid
Classification:	Non-Steroidal Anti-Inflammatory; Analgesic; Antipyretic; Anticoagulant
Indications:	Cardiac Chest Pain (ACS), STEMI
Contraindications:	Known hypersensitivity GI bleed requiring hospitalization or blood transfusion within last 6 months
Dosages:	**Adult:** Chest Pain / Suspected ACS 160-325mg PO
Side Effects:	May slow heart rate, may cause hypotension with cumulative doses
Physiological: Effects	Aspirin has an anti-thrombotic effect that does not break up the suspected clot, but does help in preventing the clot from increasing in size and/or the formation of new clots. It does this by inhibiting the enzymes (COX-1, COX-2) that form the lipid (prostaglandin) responsible for platelet aggregation (clots).
Additional Info:	Reduces the mortality associated with myocardial infarction. Aspirin *can* be administered to patients on anticoagulants but should be used with caution. Morphine may reduce aspirin's ability to block platelet aggregation, which leads to higher mortality in AMI patients.

ATROPINE

Additional Names:	Atropisol (ophthalmic), Atreza
Classification:	Anticholinergic, Sympatholytic
Indications:	Symptomatic Bradycardia, Bradyarrhythmia's Organophosphate Poisoning Pre-intubation in children requiring airway manipulation to prevent vagotropic bradycardia response
Contraindications:	Known hypersensitivity Tachycardia (relative)
Dosages:	**Adult:** Symptomatic Bradycardia 1mg IV/IO, q 3-5min prn, max dose 3mg Organophosphate Poisoning 2mg IV/IO, q5min prn until secretions resolve, no max **Pediatric:** Symptomatic Bradycardia/Pre-intubation 0.02mg/kg IV/IO, may repeat x1 prn Minimum single dose = 0.1mg Maximum single dose for child = 0.5mg Maximum single dose for adolescent = 1mg Organophosphate Poisoning 0.02mg/kg IV/IO, q5min prn until secretions resolve, no max
Side Effects:	Pupil dilation, blurred vision, headache, restlessness, confusion, tachycardia, angina, palpitations, hypertension, flushing of skin, drying of secretions, dry mouth, difficulty swallowing.
Physiological: Effects	Decreases action of the parasympathetic nervous system increasing conduction velocity (dromotropic) and heart rate (chronotropic), enhances conduction through the AV junction. Decreases bodily secretions.
Additional Info:	Overdose will cause anticholinergic toxidrome – "red as a beet, dry as a bone, blind as a bat, mad as a hatter, and hot as a desert"

BUPRENORPHINE [SUBOXONE]

Additional Names:	Subutex
Classification:	Opioid Analgesic, Synthetic Opioid
Indications:	Buprenorphine is used to treat people with opioid use disorder. Caution should be exercised in patients with respiratory depression and gastrointestinal obstruction.
Contraindications:	Known hypersensitivity
Dosages:	**Adult:** 8-16 mg PO
Side Effects:	Side effects may include respiratory depression (decreased breathing), sleepiness, adrenal insufficiency, QT prolongation, low blood pressure, allergic reactions, constipation, and opioid addiction. Among those with a history of seizures, a risk exists of further seizures.
Additional Info:	Following **buprenorphine** treatment, a patient's tolerance to opioids may diminish, posing a potential risk if they resume their previous opioid dosage.

CALCIUM CHLORIDE

Additional Names:	Calcium Replacement
Classification:	Electrolyte, Antidote
Indications:	Ca^{2+} Channel Blocker overdose Cardiac Arrest secondary to suspected hyperkalemia Suspected hypocalcemia. Hypermagnesemia (Magnesium Sulfate overdose)
Contraindications:	Known hypersensitivity Digoxin Overdose Hypercalcemia
Dosages:	**Adult:** Overdose / Acute Poisoning: Ca^{2+} Channel Blocker OD 500-1,000mg IV/IO infusion over 10-20min *w/Medical Control orders. Cardiac arrest w/ known or suspected hyperkalemia or renal disease/dialysis 1g IV/IO Traumatic Shock w/ Blood Products 2g IV/IO Crush Injury / Syndrome: Signs of Hyperkalemia present 1g IV/IO over 10min, not to exceed 1mL/min **Pediatric:** Cardiac arrest w/ known or suspected hyperkalemia or renal disease/dialysis 20mg/kg IV/IO, max 1g
Side Effects:	Sensation of “heat wave” or tingling, local burning sensation
Physiological: Effects	Calcium is an essential component for proper functioning nervous, muscular, skeletal, and endocrine systems and includes positive inotropic (contractility) and dromotropic (conduction speed) effects. It is believed to help reduce dysrhythmia caused by hyperkalemia by stabilizing the cardiac membrane resting potential. Massive hemorrhage leads to a hypo calcemic state which prevents proper coagulation. Administration of calcium chloride replaces that lost calcium supporting the body’s coagulation cascade.
Additional Info:	Irritation with extravasation *(may cause tissue necrosis) Rapid IV administration may cause sensation related to side effects. Cardiotoxicity and local phlebitis with rapid IV administration Use caution in patients with renal insufficiency or history of cardiac disease.

CALCIUM GLUCONATE

Additional Names:	None listed
Classification:	Mineral supplement, Antidote
Indications:	Ca^{2+} Channel Blocker Overdose Hydrofluoric Acid Exposure
Contraindications:	Ventricular fibrillation Hypercalcemia Concurrent use of IV Calcium Gluconate
Dosages:	**Adult:** Hydrofluoric Acid Exposure Skin Exposure: Gel: 2.5% TD to affected area Inhalation Exposure: 4ml Nebulized 2.5-5%
Side Effects:	Nausea, Constipation
Physiological: Effects	Calcium is the fifth most abundant element in the body and is essential for maintenance of the functional integrity of nervous, muscular, and skeletal systems and cell membrane and capillary permeability.
Preparation:	Calcium Gluconate Gel Mix either of the following with 5 oz of water-soluble surgical lubricant (e.g. KY Jelly): • 10ml of 10% Calcium Chloride • 3.5g of Calcium Gluconate powder Calcium Gluconate Nebulized To obtain 100ml of a 2.5% solution, mix 75ml of NS with 25ml of Calcium Gluconate 10%
Additional Info:	Take appropriate BSI precautions and decontaminate the patient as needed. Use transdermally on fingers by applying gel to the hand, squirting additional gel into a surgical glove, and inserting affected hand into the glove to keep the gel in place. Reapply every 15 minutes and massage until the pain has abated. May cause precipitation if mixed in IV fluids that contain carbonates, phosphates, sulfates, or tartrates.

CEFEPIME

Additional Names:

Classification:	Cefepime hydrochloride is a fourth-generation cephalosporin that belongs to a class of antibiotics known as beta-lactams.
Indications:	It is indicated to treat gram-positive and gram-negative bacterial infections that are susceptible to its activity. These include: • Pneumonia • Complicated and uncomplicated urinary tract infections • Skin and soft tissue infections • Complicated intra-abdominal infections (with metronidazole) • Empiric treatment for neutropenic fever
Contraindications:	Known hypersensitivity Do Not administer if pt has allergy to: Penicillin – PCN Cephalexin – Keflex
Dosages:	**Adult:** 2 gm (2000 mg) IV / IO x 1 **Pediatric:** **AGES 2 months and older** 50 mg/kg/dose IV / IO Max Dose 2 gm
Side Effects:	The most common adverse effects in adults are diarrhea and rash. The most common adverse effects in the pediatric population are fevers, diarrhea, and rash.
Additional Info:	Cefepime is not well absorbed by the gastrointestinal tract and must be administered intravenously (IV) or intramuscularly (IM).

DEXAMETHASONE

Additional Names:	Decadron, Maxidex, Baycadron, DexPak, Ozurdex
Classification:	Corticosteroid, Glucocorticoid
Indications:	Anaphylaxis Bronchospasm, Bronchiolitis, Asthma COPD with acute exacerbation Croup, Stridor
Contraindications:	Known hypersensitivity Hyperglycemia (relative)
Dosages:	**Adult:** Wheezing/Bronchospasm: Moderate/Severe 16mg PO/IV/IM/IO **Pediatric:** Lower Airway Obstruction: Asthma/Wheezing > 2yo 0.6mg/kg PO/IV/IM/IO, max 10 mg Upper Airway Obstruction: Croup/Stridor 0.6mg/kg PO/IV/IM/IO, max 10mg
Side Effects:	Hyperglycemia, Immunosuppression, GI discomfort, burning sensation.
Physiological: Effects	Long-acting corticosteroid with minimal sodium-retaining potential. It decreases inflammation by suppression of neutrophil migration, decreased production of inflammatory mediators, and reversal of increased capillary permeability; suppresses normal immune response.
Additional Info:	It is safe the give the IV formulation via PO route Diabetes and hyperglycemia are a relative contraindication – administer the drug if anti-inflammatory benefit is likely to outweigh the risk. The PO administration route is preferred in pediatric patients without an IV already established unless patient has altered LOC or airway compromise.

DEXTROSE

Additional Names:	D10, D25, D50
Classification:	Carbohydrate, Hyperglycemic
Indications:	Known hypoglycemia Altered Mental Status of unknown origin with suspected hypoglycemia
Contraindications:	Head Injury (unless documented hypoglycemia) Known or suspected Intracranial Hemorrhage (caution)
Dosages:	**Adult:** Diabetic Emergency / Hypoglycemia D50: 12.5g-25g IV/IO, (25g = 50mL of D50) D10: 12.5g-25g IV/IO, (25g = 250mL D10) Stroke: CBG < 60mg/dL D50: 12.5g-25g IV/IO, (25g = 50mL of D50) D10: 12.5g-25g IV/IO, (25g = 250mL D10) **Pediatric:** Diabetic Emergency / Hypoglycemia D50: 1ml/kg IV/IO D25: 2mL/kg IV/IO, optimal for age 1-7yo D10: 5ml/kg IV/IO, optimal for age < 1yo Cardiac Arrest D50: 1ml/kg IV/IO D25: 2mL/kg IV/IO, optimal for age 1-7yo D10: 5ml/kg IV/IO, optimal for age < 1yo
Side Effects:	Irritation, thrombosis, or necrosis can occur if dextrose is infiltrated into tissue.
Physiological: Effects	Dextrose is a monosaccharide which provides calories for the metabolic needs of the cell as an aerobic metabolic substrate of APT synthesis. Dextrose reverses the CNS effects of hypoglycemia by rapidly elevating serum blood glucose when given parenterally.
Additional Info:	May worsen ICP or cerebral edema from trauma or CVA Extravasation leads to severe tissue necrosis * Incompatible with Sodium Bicarbonate and Diazepam, thoroughly flush IV between use of same administration access point

DIAZEPAM

Additional Names:	Valium
Classification:	Benzodiazepine
Indications:	Seizure Control Anxiolytic/Sedation
Contraindications:	Known hypersensitivity Patients with a compromised respiratory status (relative) *Do not give via IN route if patient is < 6yo
Dosages:	**Adult:** Seizure 5mg IV/IM/IO, q 2min prn, max 10mg Agitated/Combative Patient 5mg IV or 10mg IM, max 10mg If agitation persists after 5min, repeat initial dose if max dose not already reached Hyperactive Delirium with Severe Agitation 10mg IV/IM If agitation persists after 5min, repeat initial dose Post Intubation Sedation 5mg IV or 10mg IM, q2min prn, max 10mg **Pediatric:** Seizure: 0.2mg/kg IV/IO/IM, max 5mg if < 5yo / max 10mg if < 10yo 0.2mg/kg IN if ≥ 12yo 0.3mg/kg IN if 6-11yo 0.5mg/kg PR, max 20mg, use PR route as last resort
Side Effects:	Rapid administration may cause respiratory depression/arrest. Paradoxical excitement or stimulation sometimes occurs.
Physiological: Effects	Modulates post-synaptic effects of gamma-aminobutyric acid (GABA) transmission, which is a major inhibitory neurotransmitter in the brain.
Additional Info:	Not to be mixed with any other injectable medication, may precipitate when administered in a D5W IV line.

DILTIAZEM

Additional Names:	Cardizem
Classification:	Calcium Channel Blocker, Antihypertensive
Indications:	Atrial Fibrillation with Rapid Ventricular Response Atrial Flutter SVT non-responsive to Adenosine ~~Acute Hypertension~~ ~~Angina~~
Contraindications:	Known hypersensitivity Heart blocks, Bradycardia Hypotension Sick Sinus Syndrome Ventricular Tachycardia Cardiogenic Shock
Dosages:	**Adult:** Narrow-Complex Tachycardia: Regular rhythm: Unresponsive to Adenosine 10mg slow IV/IO push, q5min prn, max 20mg total Narrow-Complex Tachycardia: Irregular rhythm: Stable 10mg slow IV/IO push, q5min prn, max 20mg total. **Pediatric:** *Contraindicated*
Side Effects:	Hypotension, bradycardia, headache, dizziness, arrhythmias, nausea, vomiting. Prolongation of AV node conduction may result in 2nd/3rd degree blocks.
Physiological: Effects	Inhibits the influx of calcium ions during membrane depolarization of cardiac and vascular smooth muscle, related to its ability to slow AV nodal conduction time and prolong AV nodal refractoriness. Diltiazem slows ventricular rates, interrupts the reentry circuit in AV nodal re-entry tachycardias and reciprocating tachycardias (e.g. WPW). Diltiazem also prolongs sinus cycle length and decreases peripheral vascular resistance.
Additional Info:	Monitor heart rate and blood pressure closely. Diltiazem should be used with caution in patients with impaired liver or renal function. Caution should be used in pregnant females and mothers that are nursing. Caution should be used if administered in the presence of CHF. Caution should be used when administering Diltiazem and anesthetics.

DIPHENHYDRAMINE

Additional Names:	Benadryl
Classification:	Antihistamine
Indications:	Allergic reaction Dystonia
Contraindications:	Known hypersensitivity
Dosages:	**Adult:** Anaphylaxis / Allergic Reaction 50mg IV/IM (I/O Anaphylaxis) Overdose / Acute Poisoning: Phenothiazines (Dystonic Reaction) 25-50mg IV/IO/IM **Pediatric:** Anaphylaxis / Allergic Reaction 1mg/kg IV/IO/IM, max 50mg Overdose / Acute Poisoning: Phenothiazines (Dystonic Reaction) 1-2mg/kg IV/IM, max 50mg
Side Effects:	Drowsiness, dry mouth and throat
Physiological: Effects	Blocks the cellular histamine receptors resulting in decreased capillary permeability; decreases itching, edema, bronchoconstriction, and vasodilation.
Additional Info:	Concomitant CNS depressants may enhance effect Diphenhydramine has anticholinergic effects when given at higher doses Diphenhydramine toxicity may cause cardiac arrhythmias such as torsades de pointes

DROPERIDOL

Additional Names: Inapsine

Classification: Antiemetic

Indications:
- Sedation of an agitated and/or combative patient
- Second line medication for management of intractable vomiting.

Contraindications:

Should not be used in patients >65 yo and < 12 yo

Dosages:

Adult:

Nausea / Vomiting
1.25 mg IV

Hyperactive Delirium with Severe Agitation
5 mg IM

Onset: 3-10 minutes after IV/IM administration, peak effect at 20-30 minutes.
Duration: 2-3 hours

Droperidol is a butyrophenone closely related to haloperidol.
Droperidol produces a dopaminergic blockage, a mild alpha-adrenergic blockage, and causes peripheral vasodilation. Its major actions are sedation, tranquilization, and potent anti-emetic effect.

Side Effects:

Due to the vasodilation effect, droperidol can cause a transient hypotension that is usually self-limiting and can be treated effectively with leg elevated position and IV fluids.

Droperidol may cause tachycardia which usually does not require pharmacologic intervention.

Some patients may experience unpleasant sensations manifested as restlessness, hyperactivity, or anxiety following droperidol administration. This is called akathisia and is treated with diphenhydramine.

Dystonic reactions have been noted hours to days after treatment.

Rare instances of neuroleptic malignant syndrome have been known to occur following treatment using Droperidol.

EPINEPHRINE

Additional Names: Adrenaline

Classification: Sympathomimetic, Catecholamine

Indications:
Cardiac Arrest
Bradycardia
Severe Allergic Reaction, Severe Reactive Airway Disease
CHF exacerbation
Croup/Stridor, Bronchiolitis

Contraindications:
Known hypersensitivity
Hemorrhagic Shock

Dosages:

Adult:

Anaphylaxis
0.3-0.5mg IM (1:1,000), may repeat x1 after 5 min, prn
1mL IV/IO Push Dose Epi, q 3-5min, while preparing vasopressor infusion
2-20mcg/min IV/IO Infusion

Wheezing/Bronchospasm: Severe
0.3-0.5mg IM (1:1,000)

CHF/Acute Pulmonary Edema
2-20mcg/min IV/IO infusion, titrate to MAP ≥ 65mmHg

1mL IV/IO Push Dose Epi q 3-5min prn

Cardiac Arrest
1mg IV/IO (1:10,000), q 3-5min (max 3mg)

Hypothermia induced Cardiac Arrest:
1mg IV/IO (1:10,000) ONCE until temp > 86°

Post ROSC
2-30mcg/min, titrate to MAP ≥ 65mmHg
1mL Push Dose Epi q 3-5min prn

Shock
2-20mcg/min, titrate to MAP ≥ 65mmHg
1ml IV/IO Push Dose Epi, q 3-5min, prn, while preparing vasopressor infusion

Bradycardia: In peri-arrest situations
1mL IV/IO Push Dose Epi, q 2min prn to maintain MAP ≥ 65mmHg

Bradycardia/Age-appropriate hypotension persists
0.01mg/kg IV/IO (1:10,000), q 5min prn, max 1mg total

EPINEPHRINE (continued)

Dosages: (continued)

Pediatric

Anaphylaxis
< 25kg, 0.15mg IM (1:1,000), may repeat x1 after 5min, prn
≥ 25kg, 0.3mg IM (1:1,000)
0.01-0.5mcg/kg/min Infusion w/Medical Control orders

Croup/Stridor
3mg (1:1,000) in Nebulizers, repeat PRN if stridor still present at rest

Pediatric Lower Airway Obstruction: Wheezing due to Bronchiolitis
3mg (1:1,000) via Nebulizer with Medical Control orders

Asthma/Wheezing > 2yo: Severe
≥ 25kg = O.3mg IM (1:1,000)
< 25kg = 0.15mg IM (1:1,000)

Cardiac Arrest
0.01mg/kg IV/IO (1:10,000), q 3-5min, max 1mg/dose

Shock
0.01-0.5mcg/kg/min Infusion
Consider 1mL (10mcg) IV/IO Push Dose Epi

Neonatal Resuscitation
0.01-0.03mg/kg IV/IO, 0.1mg/ml (1:10,000)

Push Dose Epi:

Adults: Mix in syringe 1mL of Epi (1:10,000) with 9mL saline. Syringe = 10mcg/mL of Epi. Administer 1mL (10mcg) IV/IO, q 3-5min, prn. Consider while preparing vasopressor infusion.

Peds: 10mcg/mL (1:100,000), 1ml/1min IV/IO, not to exceed 1mL/1min. Using 1ml syringe, draw 0.1mL of (1:10,000) and 0.9mL saline = 10mcg/mL Titrate to maintain age appropriate SBP.

Epinephrine Infusion

Mix 2mg Epinephrine (1:1,000) into 250mL NS/D5W = 8mcg/ml

Infuse using microdrip (60gtt/ml) set

Dosage	2mcg/min	4mcg/min	8mcg/min	12mcg/min	16mcg/min	20mcg/min	24mcg/min	30mcg/min
gtts/sec	1gtt/4sec	1gtt/2sec	1gtt/1sec	1.5gtts/1sec	2 gets/1sec	2.5gtts/1sec	3gtts/1sec	~4gtts/1sec
gtts/min	15gtts	30gtts	60gtts	90gtts	120gtts	150gtts	180gtts	240gtts

EPINEPHRINE (continued)

Side Effects:	Sweating, dizziness, nervousness, palpitations, weakness, pale skin, headache
Physiological: Effects	An endogenous catecholamine that stimulates the α-adrenergic and β-adrenergic receptor sites in the sympathetic nervous system. The general physiologic expectation is smooth muscle relaxation of the bronchi, vasoconstriction in the arterioles of the skin and mucosa, and an increase in heart rate and blood pressure.
Additional Info:	IM administration of Epinephrine is recognized as generally safe regardless of age. Adverse cardiovascular events are most common when Epinephrine is given intravenously. Consider the risks and benefits of Epi use in patients > 60 years old or persons with a cardiac history. Contact Medical Control for use during pregnancy due to risk to fetus.

ETOMIDATE

Additional Names:	Amidate
Classification:	General Anesthetic Hypnotic
Indications:	To induce general anesthesia to facilitate intubation
Contraindications:	Known hypersensitivity
Dosages:	**Adult:** Delayed/Rapid Sequence Intubation (if approved by agency's Medical Director) 0.3 mg/kg IV/IO
Side Effects:	Transient injection site pain, myoclonic muscle events, adrenal suppression
Physiological: Effects	Nonbarbiturate hypotonic that acts on the CNS by stimulating gamma-aminobutyric acid (GABA) receptors. Has minimal cardiovascular effects. Lacks analgesic activity.
Additional Info:	Muscle spasm is most commonly seen when Etomidate is injected quickly. Airway should be directly observed at all times when this medication is administered.

FENTANYL

Additional Names:	Sublimaze
Classification:	Opioid Analgesic, Synthetic Opioid
Indications:	Acute Pain Sedation
Contraindications:	Known Hypersensitivity to Fentanyl or other opioid agonists Known or suspected constipation or other gastrointestinal obstruction Significant respiratory depression Bradycardia
Dosages:	**Adult:** Post-Intubation Sedation 25-50mcg IV/IO, q 2min prn, max 200mcg Non-Traumatic Abdominal Pain / Nausea & Vomiting 25-50mcg IV/IO/IM/IN, q 2min prn for severe pain concerning for a surgical pathology that is not bowel obstruction or ileus (max 100 mcg) Special Populations Non-traumatic Pain Management 1 mcg/kg IV/IM/IN q 5 minutes for moderate to severe pain (max 100 mcg) Chest Pain 25-50mcg IV/IO/IN/IM, q 2min prn, max 200mcg Traumatic Pain Management 25-50mcg IM or slow IV push, q 2min prn, max 150mcg If additional analgesia is needed for persistently severe pain (8-10) believed to be due to a surgical pathology contact Med Control **Pediatric:** Traumatic Pain Management 1mcg/kg IV, 1-2mcg/kg IN, max 100mcg, may repeat x1 with Medical Control orders
Side Effects:	Bradycardia, respiratory depression, apnea, muscle rigidity, diarrhea, nausea, constipation, dry mouth
Physiological: Effects	Narcotic agonist of opiate receptors; inhibits ascending pain pathways thus altering response to pain. Produces analgesia, respiratory depression, and sedation.

Additional Info:	Effects are related to the dose and speed of administration. May cause sudden respiratory depression/arrest. Usual effects last for 30-60 min, IM onset 7-8 min with duration of 1-2 hrs Use caution with elderly or debilitated patients Use caution in patients taking other CNS depressant medications/ETOH use Use caution in patients with respiratory disease

HYDROXYCOBALAMIN (CYANOKIT®)

Additional Names:	Cyanokit
Classification:	Cyanide antidote, Vitamin B12 precursor
Indications:	Cyanide Poisoning (known or suspected)
Contraindications:	None
Dosages:	**Adult:** Cyanide Poisoning 5g IV/IO **Pediatric:** Cyanide Poisoning 70mg/kg IV/IO, max 5g
Side Effects:	Elevated blood pressure, headache, nausea, erythema, rash, infusion site reaction, red colored urine
Physiological: Effects	Vitamin B12 molecule with hydroxyl group linked to cobalt binds one cyanide ion by substituting the cobalt molecule. Cyanocobalamin is formed and renders cyanide inactive. Cyanocobalamin is excreted in the urine.
Additional Info:	Consider cyanide poisoning regardless of SpO_2 levels Cyanide can act independently from cyanide poisoning and synergistically

IPRATROPIUM BROMIDE

Additional Names:	Atrovent
Classification:	Anticholinergic (parasympatholytic), Bronchodilator
Indications:	Relieve bronchospasm associated with asthma, emphysema, and chronic bronchitis
Contraindications:	Known Hypersensitivity to Atrovent or Atropine
Dosages:	**Adult:** Wheezing / Bronchospasm 0.5mg Nebulized **Pediatric:** Asthma / Wheezing > 2yo 0.5mg Nebulized, may repeat x2 while administering other treatments
Side Effects:	Headache, dry mouth, dizziness, cough, upset stomach
Physiological: Effects	Inhibits vagally mediated reflexes by antagonizing acetylcholine receptors on bronchial smooth muscle; this leads to localized bronchodilatation
Additional Info:	Anaphylaxis / Allergic Reaction consideration: Patients who take β Blockers have an increased risk of developing a more severe reaction; these patients also may have a paradoxical response to Epinephrine. The use of inhaled Atrovent and Albuterol may help respiratory symptoms in these cases.

KETAMINE

Additional Names:	Ketalar
Classification:	Dissociative Anesthetic
Indications:	Hyperactive Delirium with Severe Agitation, Pain Management, Post-Intubation Sedation
Contraindications:	Known hypersensitivity Hypertensive Crisis
Dosages:	**Adult:** Hyperactive Delirium with Severe Agitation 2mg/kg IV/IO or 3mg/kg IM, max IM/IV dose = 300mg If agitation persists after 5 minutes, repeat Ketamine at half the initial dose. Post-Intubation Sedation 2mg/kg IV/IO or 3mg/kg IM, q 10min prn, may repeat x1 Cardiac Arrest/Post ROSC: for occurrence of varying states of consciousness 1mg/kg IV/IO for sedation/amnesia Bradycardia: Prior to TCP Pre-medicate with 1mg/kg IV/IO/IM, max 200mg, if possible Traumatic Pain Management 2mg/kg q 15 minutes prn (max 50mg IV/IO; 100mg IN/IM **slow push**) Contact Medical Control if additional analgesia in needed. Wheezing/bronchospasm: 0.2 mg/kg (max 200) IV drip **Pediatric:** Wheezing/bronchospasm: 0.2 mg/kg (max 100) IV drip Traumatic Pain 0.2 mg/kg (max 100) IV/IO drip
Side Effects:	Emergence reaction, visual hallucinations, tachycardia, hypertension, respiratory depression/laryngospasms when given rapidly, bronchodilation, hypersalivation
Physiological: Effects	Dissociative agent that blocks the NMDA receptor, producing profound anesthesia and analgesia. In lower doses, ketamine is a potent analgesic. Unlike opiates, ketamine does not suppress the central nervous system, which makes it ideal for use when sedation or pain management is needed in the hemodynamically compromised patient. Ketamine has been shown to exacerbate signs and symptoms of underlying acute/chronic psychosis and should be used with caution for patients with

	known/suspected psychiatric history such as schizophrenia, and/or psychostimulant use (cocaine, methamphetamine, PCP, recreational ketamine)
Additional Info:	**Infusions are mixed into 100ml NS** Ketamine delivers optimal therapeutic effects when administered via **slow push** (at least over 60 seconds IV or via infusion over 10-15 minutes). Administration delivered over shorter periods of time have reported increase in discomfort, laryngospasm, and severity of dissociation. If a patient exhibits laryngospasms/respiratory depression/respiratory pause, assist ventilations with bag valve mask. Respiratory compromise is typically brief (i.e. less than 5-10 minutes) and does not require intubation. Emergence reactions may occur when ketamine begins to wear off and can be mitigated with benzodiazepines. Ketamine does not address the life-threatening symptoms of hyperactive delirium (ie tachycardia, hyperthermia, tachypnea). If these issues are present preference should be given to a benzodiazepine over Ketamine.

KETOROLAC (TORADOL)

Additional Names: Toradol

Classification: Dissociative Anesthetic

Indications: Pain Management
moderate to severe pain caused by inflammation such as:
Moderate pain from trauma associated with swelling
Sickle Cell
bone cancer patients

Contraindications: Should not be used in patients with renal concerns.

Dosages:

Adult:

Traumatic Pain Management
15 mg/kg IV / IM
Contact Medical Control if additional analgesia in needed.

ACS Pain Management
15 mg/kg IV / IM

Non – Traumatic Abdominal Pain Management
15 mg/kg IV / IM

Pediatric:

Traumatic Pain Management
0.5 mg/kg IV / IM (max 15 mg)

Additional Information: Does not affect mental status, respiratory drive, mobility of intestines.
It is an ideal alternative for patients in remission from opioid abuse, patients with hypersensitivity to or reservations about opioid medications, patients presenting with constipation.

LIDOCAINE

Additional Names:	Lidocaine CV, Xylocaine
Classification:	Antidysrhythmic (class Ib), Local Anesthetic
Indications:	Ventricular Arrhythmia Local Infiltration Anesthesia prior to IO infusion
Contraindications:	Known Hypersensitivity to lidocaine or amide-type local anesthetic Congestive Heart Failure Cardiogenic Shock 2° and 3° heart block if no pacemaker is present
Dosages:	**Adult:** Cardiac Arrest Consider 1 mg/kg slow IV bolus over 2-3 min after defibrillation, CPR, and vasopressor administration. Repeat x 1 after 5 min for persistent VF/VT Intraosseous Access 20-40mg IO after IO insertion for pain relief in conscious patients Allow lidocaine 2 minutes to take effect before flushing
Side Effects:	Dermatologic: edema, erythema at injection site, petechiae. Cardiovascular: hypotension
Physiological: Effects	Class Ib antidysrhythmic combines with fast Na channels and inhibits recovery after repolarization, resulting in decreasing myocardial excitability
Additional Info:	Constant monitoring with and EKG is essential to the proper administration of IV lidocaine. When lidocaine is administered with other antiarrhythmic drugs such as amiodarone, phenytoin, procainamide, propranolol, or quinidine, the cardiac effects may be additive or antagonistic.

LORAZEPAM

Additional Names:	Ativan
Classification:	Benzodiazepine
Indications:	Seizure Control Anxiolytic, Sedation
Contraindications:	Known Hypersensitivity Narrow-Angle Glaucoma Patients with a history of sleep apnea syndrome
Dosages:	**Adult:** Seizure 2mg IV/IM/IO, q2min prn, max 8mg Agitated/Combative Patient 2mg IV or 4mg IM, max 8mg If agitation persists after 5min, repeat initial dose if max dose not already reached Hyperactive Delirium with Severe Agitation 4mg IV/IM If agitation persists after 5min, repeat initial dose Post Intubation Sedation: 2-4mg IV/IM, q2min prn, max 10mg **Pediatric:** Seizure 0.1mg/kg IV/IO/IM, max 4mg, may repeat x1 after 5 min
Side Effects:	Sedation, dizziness, fatigue, amnesia, drowsiness. Rapid administration may cause respiratory depression/arrest.
Physiological: Effects	Sedative hypnotic increases the action of gamma-aminobutyric acid (GABA), which is a major inhibitory neurotransmitter in the brain.
Additional Info:	Not to be mixed with any other agents or diluted with IV solutions. Administer via the proximal end of the IV tubing and flush well. Most likely to produce respiratory depression in patients who have taken other depressant drugs, especially alcohol and barbiturates. Can cause local venous irritation. Use relatively large veins, if possible.

MAGNESIUM SULFATE

Additional Names:	$MgSO_4$
Classification:	Antidysrhythmic, Electrolyte, Smooth Muscle Relaxant
Indications:	Asthma, Reactive Airway Disease Eclampsia Torsade de Pointes
Contraindications:	Known Hypersensitivity Heart blocks, Bradycardia, Myocardial damage (relative) Hypotension, Shock
Dosages:	**Adult:** Wheezing/Bronchospasm: Severe 2g IV/IO over 10min (mixed in 100mL NS/D5W) Seizure in pregnancy > 20 weeks gestation 4g IV/IO in 100mL NS/D5W infusion over 10min or 10g IM (5g in each buttock) if unable to obtain IV access Cardiac Arrest – Torsade de Pointes / Polymorphic VT 2g IV/IO Tachycardia – Torsade de Pointes / Polymorphic VT 1-2g IV/IO over 10min. **Pediatric:** Asthma/Wheezing > 2yo: Severe 50mg/kg IV over 10min, max 2g Cardiac Arrest – Torsade de Pointes / Polymorphic VT 50mg/kg IV/IO, max 2g Tachycardia – Torsade de Pointes / Polymorphic VT 50mg/kg IV/IO over 20min
Infusion Set-Up:	Waste 150mL of 250mL NS/D5W leaving 100mL in bolus. Add 2-4g of $MgSO_4$ to bolus. Using a 15gtt/mL macro drip set, administer infusion at a rate of *2.5gtts/sec* (aka 150 gtt/min) to deliver over 10 minutes.
Side Effects:	Hypotension, flushing, drowsiness, respiratory depression/paralysis, CNS depression and paralysis

MAGNESIUM SULFATE (continued)

Physiological: Effects	Magnesium Sulfate reduces striated muscle contractions and blocks peripheral neuromuscular transmission by reducing acetylcholine release at the myoneural junction. Magnesium Sulfate effectively decreases the risk of preeclampsia progressing to eclampsia and effectively terminates seizures. The anticonvulsant activity is suspected to be due to magnesium's role as an N-methyl-D-aspartate (NMDA) antagonist.
Additional Info:	Administer with caution if flushing and sweating occurs. Use with caution when co-administered with barbiturates, narcotics, other hypnotics, or systemic anesthetics. CNS depressants may be additive; dosages often require adjustments. Because Magnesium is removed from the body solely by the kidneys, the drug should be used with caution in patients with renal impairment. Consider the risk and benefit of its use prior to administering to patients with renal failure. High levels of magnesium can cause sinus bradycardia and blocks. Consider the risk and benefits of its prior to administering to patients with cardiac disease.

METHYLPREDNISOLONE

Additional Names:	Solu-Medrol, Medrol
Classification:	Steroid-Glucocorticoid, Anti-Inflammatory Agent
Indications:	Anaphylaxis, Allergic Reaction Asthma, COPD Adrenal Crisis
Contraindications:	Known Hypersensitivity Use with caution in patients with diabetes Use with caution in patients with GI bleeding
Dosages:	**Adult:** Wheezing/Bronchospasm: Moderate/Severe 125mg IV/IO/IM Anaphylaxis 125mg IV/IO/IM Shock – if patient has Addison's Disease or other forms of Adrenal Sufficiency 125mg IV/IO/IM with *Medical Control orders **Pediatric:** Lower Airway Obstruction: Asthma/Wheezing > 2yo 2mg/kg IV/IM/IO, max 125mg Anaphylaxis 2mg/kg IV/IM/IO, max 124mg
Side Effects:	Dizziness, weakness, sleep disorders, sodium and water retention, nausea, hypokalemia, hyperglycemia
Physiological: Effects	Methylprednisolone is a synthetic corticosteroid. Corticosteroids are hormones produced by the adrenal glands and are involved in several physiological systems such as stress response, Immune system response, and regulation of inflammation.
Additional Info:	Adrenal Crisis / Addison's Disease presents with hypotension or shock out of proportion to the severity of the illness; it can be fatal if not diagnosed and treated aggressively with steroid replacement. Contact Medical Control for consultation.

METOPROLOL

Additional Names:	Lopressor, Toprol
Classification:	Beta-Adrenergic Blocker
Indications:	Atrial Fibrillation Uncontrolled, Atrial Flutter, SVT non-responsive to Adenosine
Contraindications:	Known Hypersensitivity 2nd and 3rd degree Heart Blocks Bradycardia, Hypotension Cardiogenic Shock Bronchial Asthma Pediatrics
Dosages:	**Adult:** Narrow-Complex Tachycardia: Regular rhythm: Unresponsive to Adenosine 5mg slow IV/IO push, q5min prn (max 15mg total) Narrow-Complex Tachycardia: Irregular rhythm: Stable 5mg slow IV/IO push, q5min prn (max 15mg total)
Side Effects:	Bradycardia, headache, dyspnea, light-headedness, dizziness, weakness, nausea, vomiting, ankle swelling
Physiological: Effects	Beta-adrenergic receptor blocker, with preferential effect on Beta1-adrenoceptors ~~chiefly~~ located in the cardiac muscle. The preferential effect is not absolute and at high doses, Beta2-adrenoreceptors chiefly located in the smooth bronchial muscles and vascular musculature can be affected. Beta-blocking activity is shown to reduce heart rate and cardiac output. Metoprolol has no intrinsic sympathomimetic activity.
Additional Info:	Monitor heart rate and blood pressure closely. Use with caution in pulmonary disease and CHF

MIDAZOLAM

Additional Names: Versed

Classification: Benzodiazepine, Anxiolytic

Indications:
Seizure Control
Anxiolytic, Sedation
Pre-medication before TCP

Contraindications:
Known Hypersensitivity
Narrow-Angle Glaucoma
Hypotension

Dosages:

Adult:

Seizure
10mg IM if seizing upon arrival
2.5mg IV/IM/IO, q2min prn, max 10mg (not including initial IM dose if seizing upon arrival)

Agitated/Combative Patient
2.5-5mg IV/IM/IN, max 10mg
If agitation persists after 5min, repeat initial dose if max dose not already reached

Hyperactive Delirium with Severe Agitation
5mg IV/IM
If agitation persists after 5min, repeat initial dose

Post Intubation Sedation
5mg IV/IO/IM, q2min prn, max 20mg

Bradycardia – TCP Premedication
2.5-5mg IV/IO/IN, if possible, for sedation

Tachycardia – Cardioversion Premedication
2.5-5mg IV/IO/IN, if possible, for sedation

Congestive Heart Failure – Anxiolytic prior to CPAP
2.5 mg IV/IO/IM x1 prn

Pediatric:

Seizure:
0.2mg/kg IM/IN, max 5mg, if seizing on arrival, may repeat x1 q5min
0.1mg/kg IV/IO, max 2mg, may repeat x1 q5min

Side Effects:
Rapid administration may cause respiratory depression/arrest
Hypotension, cardiac arrhythmias, anterograde amnesia

MIDAZOLAM (continued)

Physiological: Effects	Induces effects by acting on parts of the gamma-amino butyric acid (GABA) and benzodiazepine receptors, the major inhibitory neurotransmitters in the CNS. Contains anxiolytic, anticonvulsant, sedative, muscle relaxant, and amnesic properties.
Additional Info:	Potentiates the effects of other CNS depressants. Use lower end of dosing range in debilitated patients, including the elderly. Do not dilute for IM/IN administration. Considered to be twice as potent as Diazepam, milligram for milligram

MORPHINE SULFATE

Additional Names: MS Contin

Classification: Opioid Analgesic

Indications:
Chest pain unrelieved by Nitroglycerin
Traumatic Injury
Burn

Contraindications:
Known Hypersensitivity to Morphine or other opioid agonists
Paralytic ileus
Head injury

Dosages:

Adult:

Chest Pain
2-4mg IV/IO/IM, q2min prn, max 10mg

Traumatic Pain Management
2-4mg IV/IO/IM, q2min prn, max 10mg
If additional analgesia is needed for persistently severe pain (8-10) believed to be due to a surgical pathology contact Med Control

Pediatric:

Traumatic Pain Management
< 1yo: 0.05mg/kg IV/IO
≥ 1yo: 0.1mg/kg IV/IO max 4mg
May repeat x1 with Medical Control orders

Side Effects: Decreased blood pressure, nausea/vomiting, altered level of consciousness, respiratory depression

Physiological Effects: Narcotic agonist-analgesic that inhibits ascending pain pathways, thus altering response to pain. Acute administration causes vasodilation and decreased sympathetic tone, resulting in bradycardia and decreased blood pressure. The Increases venous capacitance, decreases venous return, and produces mild peripheral vasodilation. Morphine also decreases myocardial oxygen demand.

Additional Info:
The effects of morphine are potentiated by alcohol, antihistamines, barbiturates, sedatives, and beta blockers.

The decreased myocardial oxygen demand of morphine can be nullified if respiratory depression decreases oxygen supply.

The use of morphine in NSTEMI is controversial, as it may inhibit the absorption and efficacy of antiplatelet agents. Use judiciously.

NALOXONE

Additional Names:	Narcan
Classification:	Opioid Antagonist, Opioid Reversal Agent
Indications:	Respiratory depression due to opioid intoxication
Contraindications:	Known hypersensitivity
Dosages:	**Adult:** Overdose / Acute Poisoning: Suspected Opiate Overdose 0.5-2 mg IV/IM/IO, q2-3 min prn 2-4 mg IN, q2-3min prn **Pediatric:** Pediatric Altered Mental Status: Suspicion of Opiate/Opioid Ingestion 0.1mg/kg IV/IO/IN, q2-3min, titrate prn (max 2mg/dose)
Side Effects:	Withdrawal symptoms (especially in neonates), combativeness, hyperventilation, tachycardia, hypertension, nausea/vomiting
Physiological Effects:	Naloxone competitively binds to the β-endorphin receptors in the central nervous system, thereby reversing the effects of opiates and their derivatives. Naloxone completely reverses the effects of opioids and causes a sudden onset of withdrawal symptoms.
Additional Info:	Naloxone doses should be used to reverse respiratory depression, not to fully awaken the patient. Anticipate combative behavior and ensure provider safety in advance. IV doses greater than 0.5mg increase the risk of flash pulmonary edema – this chance increases in proportion to the administration dose Synthetic opioids (e.g. fentanyl, carfentanil) frequently require doses greater than 2mg.

NITROGLYCERIN

Additional Names:	Nitrostat, NitroDur, Transdermal Nitro
Classification:	Vasodilator, Antianginal Agent
Indications:	Chest Pain suspected to be cardiac in nature (ACS/STEMI) Congestive Heart Failure
Contraindications:	Known Hypersensitivity Recent use of erectile dysfunction medications (Viagra/Levitra within 24 hours, Cialis within 48 hours) SBP < 100mHg Hypovolemia Suspected Right Ventricular Infarction (relative)
Dosages:	**Adult:** Chest Pain / Suspected ACS 0.4mg SL, q 3min prn for chest pain, max 3 doses CHF / Acute Pulmonary Edema 0.4mg SL, q5min prn (no max) if SBP ≥ 100mmHg 0.8mg SL, q5min prn (no max) if age < 85 and SBP > 200mmHg
Side Effects:	Headache, hypotension, palpitations, flushing, nausea/vomiting
Physiological: Effects	Relaxes smooth muscles, thus producing vasodilator effects on arteries and veins and reducing preload and afterload. Causes coronary artery dilatation.
Additional Info:	Monitor blood pressure and EKG after each dose. Do not allow medication to come in contact with your skin. Use gloves for application.

NOREPINEPHRINE

Additional Names: Levophed

Classification: Sympathomimetic, Vasopressor

Indications: Shock

Contraindications: Known hypersensitivity
Hypovolemia

Dosages:

Adult:

Shock
2-12mcg/min IV/IO infusion, titrate to MAP ≥ 65mmHg

CHF/Acute Pulmonary Edema:
2-12mcg/min IV/IO infusion, titrate to MAP ≥ 65mmHg

Post ROSC
2-12mcg/min IV/IO infusion, titrate to MAP ≥ 65mmHg

Pediatric:

Shock
0.01-0.5mcg/kg/min Infusion

Norepinephrine Infusion

Mix 4mg Norepinephrine into 250mL NS/D5W = 16mcg/ml

Infuse using micro drip (60gtt/mL) set

Dosage	2mcg/min	4mcg/min	6mcg/min	8mcg/min	10mcg/min	12mcg/min
gtts/sec	~1gtt/8sec	1gtt/4sec	~1gtt/3sec	1gtt/2sec	~0.5-0.75 gtt/sec	~0.75-1 gtt/sec
gtts/min	8gtts/min	15gtts/min	22gtts/min	30gtts/min	38gtts/min	45gtts/min

** Do not forget to label IV bag "Norepinephrine 16mcg/ml **

Side Effects: Hypertension, arrhythmias, reflex bradycardia ischemic injury due to vasoconstriction, headache, dyspnea (with or without respiratory difficulty)

Physiological Effects: Norepinephrine functions as a peripheral vasoconstrictor (α-adrenergic action) and as an inotropic (contractility) stimulator of the heart and dilator of coronary arteries (β-adrenergic action).

NOREPINEPHRINE (continued)

Additional Info:

Constantly monitor the blood pressure and adjust dose according to the MAP (Goal > 65). Avoid hypertension.

When possible, Norepinephrine infusion should be given via a large vein, preferable a vein in the antecubital fossa.

Ensure patient is not fluid depleted. Fluid resuscitation should be considered when appropriate.

ONDANSETRON

Additional Names:	Zofran
Classification:	Antiemetic
Indications:	Nausea and Vomiting
Contraindications:	Known hypersensitivity History of congenital long QT syndrome
Dosages:	**Adult:** Post Intubation Sedation: Consider pre-intubation 4mg IV/IO to decrease aspiration risk Non-Traumatic Abdominal Pain / Nausea & Vomiting 4mg IV/IO/PO, q 15min prn, max 8mg Chest Pain 4mg IV, prn for nausea vomiting with active pain, max 8mg Traumatic Pain Management: Nausea/Vomiting due to Analgesia 4mg IV/IO/IM, q 15min prn, max 8mg **Pediatric:** Nausea / Vomiting and Dehydration 2mg IV/IO/PO, (8-15kg) 4mg IV/IO/PO, (> 15kg)
Side Effects:	Constipation, fatigue, headache. Rare cardiac effects include arrhythmias, QT prolongation, palpitations
Physiological Effects:	Selective 5-HT3 receptor antagonist that bind to receptors in the CNS and GI tract. Mechanism not fully characterized.
Additional Info:	Onset in seconds It is safe to give IV formulation orally, if tolerated

ORAL GLUCOSE

Additional Names:	Glucose, Insta-Glucose
Classification:	Monosaccharide
Indications:	Hypoglycemia
Contraindications:	Known Hypersensitivity Inability for patient to protect their own airway or follow commands
Dosages:	**Adult:** Hypoglycemia 15g PO **Pediatric:** Hypoglycemia 15g PO
Side Effects:	Negligible
Physiological: Effects	Increases blood serum glucose level by absorption through mucous membranes
Additional Info:	May be administered by EMT/NRP provided there is no risk of aspiration related to the patient's mental status.

ROCURONIUM

Additional Names:	Zemuron
Classification:	Neuromuscular Blocking Agent
Indications:	Pharmacologically assisted endotracheal intubation
Contraindications:	Known Hypersensitivity
Dosages:	**Adult:** Delayed & Rapid Sequence Intubation (if approved by agency's Medical Director) 1.2 mg/kg IV/IO 1.6 mg/kg IV/IO if patient is hypotensive
Side Effects:	Dose-related tachycardia, hypertension, transient hypotension, injection site edema
Physiological: Effects	Nondepolarizing skeletal muscle relaxant; inhibits depolarization.
Additional Info:	Rapid onset of action (60-90 sec). Duration 45-120 min. Minimal cardiovascular effects. Additive/synergistic effect if administered with or following an opioid, sedative, or anesthetic agent

SODIUM BICARBONATE

Additional Names: None

Classification: Electrolyte Buffer

Indications:
Pre-existing metabolic acidosis (perfusing patient able to self-ventilate)
Hyperkalemia
TCA, Phenobarbital, or ASA overdose

Contraindications:
Metabolic Alkalosis
Hypokalemia
Simultaneously with Calcium Chloride
Simultaneously with Catecholamines (Epinephrine, etc.)

Dosages:

Adult:

Overdose: ASA, TCA, or Unknown Medication OD with QRS > 120ms
1-2mEq/kg IV/IO, repeat prn until QRS ≤ 120ms *w/Medical Control orders

Hyperactive Delirium with Severe Agitation: Cardiac Arrest
100mEq (2 amps) early in resuscitation
-followed by-
50mEq (1 amp) q10min for remainder of resuscitation

Sodium Channel Blocker OD with QRS > 120ms
1mEq/kg IV/IO, w/ Medical Control orders

Crush Injury / Syndrome: Signs of Hyperkalemia NOT present
50mEq added per liter of NaCl

Crush Injury / Syndrome: Signs of Hyperkalemia present
100mEq Bolus IV/IO

Irritant Gas / Simple Asphyxiant Exposure: Chlorine Exposure
2.5ml mixed with 2.5mL sterile water Nebulized

Pediatric:

Side Effects:
Metabolic Alkalosis
CHF (edema secondary to sodium overload)
Hypernatremia

SODIUM BICARBONATE (continued)

Physiological: Effects	Bicarbonate is an anion that forms a salt (sodium bicarbonate) when it combines with its conjugate acid. Bicarbonate serves as the principal buffer for the body's acid/base buffer system maintaining the CO_2 level.
Additional Info:	Sloughing will occur if infiltrated out of vein into tissue.

SUCCINYLCHOLINE

Additional Names:	Suxamethonium, Anectine
Classification:	Neuromuscular Blocking Agent
Indications:	Pharmacologically assisted endotracheal intubation
Contraindications:	Known Hypersensitivity CVA or spinal cord injury within the last 6 months Chronic renal failure on hemodialysis Suspicion of hyperkalemia Known or suspected muscular disease (e.g. ALS, muscular dystrophy, myasthenia gravis, Guillain-Barre syndrome) History of malignant hyperthermia
Dosages:	**Adult:** Delayed & Rapid Sequence Intubation (if approved by agency's Medical Director) 2 mg/kg IV/IO
Side Effects:	Excessive salivation, muscle fasciculations, rise in intracranial, intraocular, intragastric pressure. May cause rhabdomyolysis.
Physiological: Effects	Depolarizing muscle relaxant.
Additional Info:	Rapid onset of action (45-60 sec). Duration 5-10 min. Do not use to maintain paralysis.

TRANEXAMIC ACID

Additional Names:	TXA, Cyklokapron
Classification:	Antifibrinolytic Agent
Indications:	Major Hemorrhage (trauma)
Contraindications:	Known Hypersensitivity ≥ 3 hours from time of injury Subarachnoid Hemorrhage Active intravascular clotting
Dosages:	**Adult:** Traumatic Shock 2g IV/IO over 10 min, if available
Side Effects:	Hypotension if given rapidly, diarrhea, nausea, vomiting, and blurred vision
Physiological: Effects	TXA is a synthetic amino acid that prevents plasminogen from being converted to plasmin. Plasmin is responsible for breaking down already formed clots in the body in a process known as fibrinolysis. When TXA is administered, it will prevent the body from breaking down clots so that the natural clotting processes can work to control non-compressible hemorrhage.
Additional Info:	May give IM as a last resort Administer TXA no later than 3 hours from time of injury TXA administered within 1 hour of time of injury has shown to significantly reduce the risk of death due to bleeding If hypotension occurs slow down infusion rate