

MEMORIAL EMS SYSTEM  
CRITICAL CARE MANUAL

*Memorial Medical Center  
EMS System*



*Critical Care Manual*

Updated Edition August 2021



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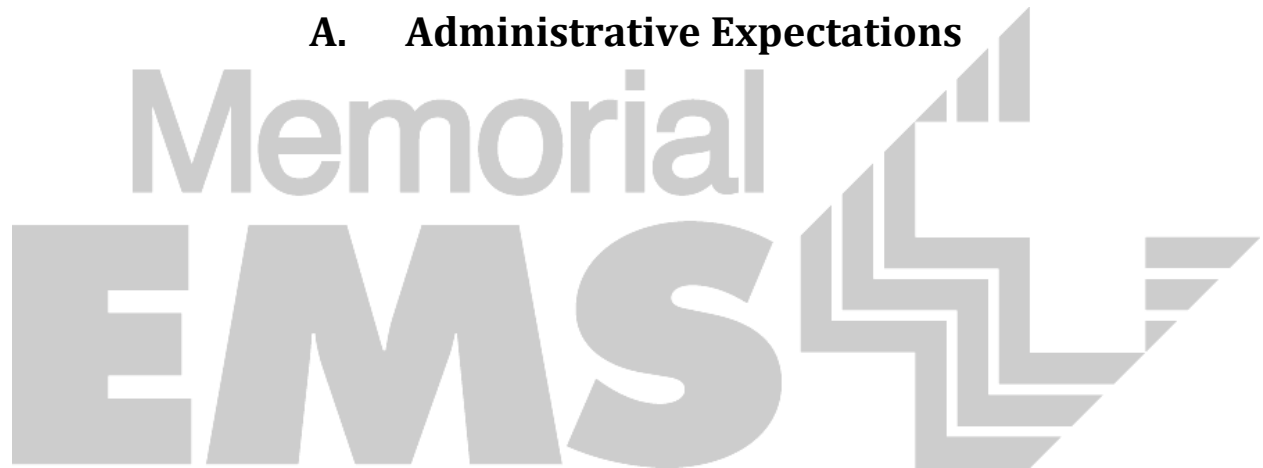
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**A. Administrative Expectations**



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**Statement of Purpose, Policy and Applicability**

In 2014, Memorial EMS took a great step forward to address the needs of our patients and our communities. To do this, we began the process of building a ground Critical Care Transport program in Central Illinois. This Critical Care Transport program is designed to meet the needs of hospitals whose critically ill and injured patients require treatment at a facility with greater capabilities. With the increased volume of these patient transfers occurring, a safe, consistent, and quality transport program was especially needed in the greater community of Critical Access Hospitals. To transport patients of this level of acuity was no simple lift in capabilities, but a focused mission developed by several providers of the Memorial EMS System. To meet this need, Memorial EMS Critical Care Transport now provides care at Tier I, Tier II and Tier III as outlined by the Illinois Department of Public Health. Tier I will continue to sit as a stand alone manual for all transport providers. Tier II and Tier III protocols are outlined in this manual.

The Memorial EMS *Prehospital Care Manuals* serve as a resource for information, treatment guidelines, and points of attention for the Prehospital Care Provider. They are designed to begin with basic assessment and treatment and build up to more advanced care for specific illnesses or injuries. The *Patient Care Manuals* can continue to serve as a resource for the Critical Care Transport (CCT) provider in such situations as the initial assessment and/ or treatment needs to be completed or re-evaluated.

The Memorial EMS *Critical Care Manual* expects that treatment will be assumed from a caregiver of a certain level and continues that care through the capacities of the CCT team. The enclosed treatment policies and protocols are intended for the care of a patient from one hospital facility to another hospital facility. Furthermore, the Memorial EMS *Critical Care Manual* is written specifically to address the needs of the adult patient (age 16 or greater). Patients under age sixteen may meet criteria for this program and are addressed in specifics within this manual.

The Memorial EMS system will continue to strive for the highest quality care we can give our patients, the best education we can give our providers, and protocols which help us best care for those who call in a time of need. Quality improvement review are performed on patient care, Prehospital provider education, and system wide protocols regularly to ensure our policies, procedures, and providers remain the highest quality that we can provide. As healthcare continues to improve and evolve, we continue to raise the expectation of care for our providers, specifically at the Critical Care level. Providing care at such an advanced level is both a responsibility and a privilege. As we work to address the needs of this growing patient need, I ask that you become advocates, both for your patient and for the advancement of your profession.

Sincerely,



Matthew Johnston, MD

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## Scope of Practice CCT Tier II and Tier III

In order to better meet the needs of our patients, our transferring facilities and our Critical Care Transports providers, an additional level of care has been added to these protocols. With this addition, providers must be ever more attentive to the needs of the patient at the time of request so to ensure that the crew responding for the transport is capable and qualified to address all expected needs of the patient during the time of care and transport.

In order to outline the capabilities of Tier II and Tier III, protocols were rewritten in 2018. Included in this rewrite is clarification as to what protocols meet the capabilities of Tier II and where Tier III is needed. Crews at the Tier II level need to critically assess the situation they are asked to respond to and their ability to meet that patient's needs. Crews must have the ability to defer the request based on concerns about their ability to meet the needs of the patient.

As providers review this manual, sub headings for Tier II and Tier III have been added. Additionally, a red line will be noticed at the point where the patients care exceeds the ability of the Tier II provider and requires a Tier III crew, or hospital staffed equivalent. Questions about the ability to take a transport request can continue to be assisted by the EMS Office and Medical Control at Memorial Medical Center.



## Pediatric Transfer Requests

### Tier III

The adult population equates to a greater than equal proportion of critically ill and injured patients who seek treatment in the healthcare system. The adult population, due to their longer time to develop medical conditions, greater range of activities and work environments, are significantly more likely to suffer from complex and compounding medical conditions. As such, adult medical and trauma patients will be the most common patient that the CCT team will be called upon to transport.

In regards to pediatric patients, often the decreased frequency of such patients, leads to a need to transfer the pediatric patient. Such requests should be triaged for the most appropriate receiving facility as well as the most appropriate transport method. At this point pediatric transports will be categorized into two groups: ages 13-15 and under age 13.

Transport requests for patients ages 13-15 can be conditionally accepted by the CCT team. Included in the information received at initial contact, must be patient history, interventions, current status, transport orders and distance of transport. The CCT team must then contact **Medical Control** for review and approval of the transport. The CCT team shall contact the requesting facility within ten minutes of the request to confirm or deny their ability to accept the request.

Transport requests for patients under age 13 can be conditionally accepted by the CCT team based on the status of the patient. Included in the information received at initial contact, must be patient history, interventions, current status, transport orders and distance of transport. Patients under age 13 must be considered stable at discharge from the transfer facility. Interventions must be limited to monitoring of cardiac rhythm, previously initiated intravenous medications, and non-invasive respiratory support. The CCT team must then contact **Medical Control** for review and approval of the transport. The CCT team shall contact the requesting facility within ten minutes of the request to confirm or deny their ability to accept the request.

Of note, many of these transfers may not seem to meet CCT level of care, but will require the full complement of CCT providers in order to meet the level of care expectations of the transferring facility.



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## Provider Responsibilities

Listed below are the requirements for agencies to function at the Critical Care Level under the Memorial EMS System. This list is based on the System manuals and IDPH rules and regulations. The requirements are grouped in four categories (Operational Requirements, Notification Requirements, System Certification Requirements and Reporting Requirements.)

### Operational Requirements

1. A provider agency must comply with minimum staffing requirements for the Tier III Critical Transport Ambulance. Staffing patterns must be in accordance with the provider's approved system plan and in compliance with Section 515.830(f). Staffing requirements for Tier II will be required to exceed the minimum outlined in Section 515.830(f).
  - a. Tier III requires a Critical Care credentialed paramedic, a Registered Nurse meeting EMS System requirements and an EMT who assists on scene, but has responsibility for transportation to ensure the patient care team always includes the CCT paramedic and Registered Nurse.
  - b. Tier II requires a Critical Care credentialed paramedic, an Expanded Scope (Tier I) paramedic and an EMT who assists on scene, but has responsibility for transportation to ensure the patient care team always includes the CCT paramedic and the Expanded Scope paramedic.
2. No agency shall employ or permit any member or employee to perform services for which he or she is not licensed, certified or otherwise authorized to perform (Section 515.170).
3. A provider agency must comply with the requirements for the Patient Care Report as outlined in the Patient Treatment Overview.
4. Agencies with must abide by all provisions of the Controlled Substance Policy including: *maintaining a security log, maintaining a Controlled Substance Usage Form and reporting any discrepancies to the EMS Office.*
5. Notify the EMS Office of any incident or unusual occurrence which could or did adversely affect the patient, co-worker or the System within 24 hours via incident report form.

Agencies functioning at the Critical Care Transport level, must meet the Quality Assurance requirements set forth by the EMS System Office. Every report is to be reviewed at the agency level. Reports are to be forwarded to the EMS Office weekly for the first year and then may be allowed to report less frequently (at minimum quarterly.)

## Provider Responsibilities (continued)

### Notification Requirements

An agency participating as an EMS provider in the Memorial EMS System must notify the Resource Hospital, (Memorial Medical Center), of the following:

1. Notify the System in **any** instance when the agency lacks the appropriately licensed and System-certified personnel to provide 24-hour coverage. Transporting agencies must apply for an ambulance staffing waiver if the agency is aware a staffing shortage is interfering with the ability to provide such coverage.
2. Notify the System of agency personnel changes and updates **within 10 days**. This includes addition of new personnel and resignations of existing personnel.

Rosters must include: *Name/level of provider, license number, expiration date, current address, phone number, date of birth, and all certification documents.*

3. Notify the System anytime an agency is not able to respond to a call due to lack of staffing. The report should also include the name of the agency that was called for mutual aid and responded to the call.
4. Notify the System of **any** incident, via incident report within 24 hours, which could or did adversely affect the patient, co-worker or the System.
5. Notify the System of any changes in medical equipment or supplies.
6. Notify the System of any changes in vehicles. Vehicles must be inspected by the System and the appropriate paperwork must be completed **prior** to the vehicle being placed into service.

## Provider Responsibilities (continued)

### Certification Requirements

The ability to work in the field of Critical Care Transport is a privilege and responsibility that should not be taken lightly. Providers functioning at this level must meet and maintain specific requirements in order to function within a Critical Care Transport vehicle or vehicles.

1. A System applicant must hold a State of Illinois license for a minimum of two years.
2. A System applicant must have two years or more experience in the capacity in which they are applying for.
3. A *Pre-Certification Application* must be completed and submitted to the EMS Office.
4. The System applicant must also submit copies of the following:
  - IDPH license (Paramedic or PHRN) or IDPFR license (RN)
  - National Registry certification (if applicable)
  - ACLS
  - PHTLS, ITLS, TNCC, TNS or BTLS
  - PEPP, PALS or ENPC
  - CPR {AHA Healthcare Provider OR American Red Cross}
  - Letter of reference from current EMS Medical Director
  - Resume (education and employment history)
  - CCEMTP, CCP-C, FP-C (Paramedics or PHRN)
    - Additional certifications will be reviewed on a case by case basis
  - CCEMTP, CEN, CCRN, CFRN or CTRN (RN)
5. All providers functioning at the Critical Care Transport level must be approved to function by the EMS Medical Director, Critical Care Coordinator or EMS System Coordinator.
6. The System applicant must pass the Memorial EMS System CCT Protocol Exam with a score of **70% or higher**. The applicant may retake the exam with the approval of the EMS Medical Director. A maximum of two (2) retakes are permitted. Updated competencies are required annually in compliance with Section 515.830.
7. Successfully complete any practical skills evaluations required by the EMS Medical Director.

## Provider Responsibilities (continued)

8. Satisfactory completion of a **90-day** probationary period is required once System-certification is granted. If the provider completes fewer than ten (10) transports in the 90-day probationary period, the time will be extended to 180-days.
9. The EMS Medical Director reserves the right to deny System provider status or to place internship & field skill evaluation requirements on any candidate requesting System certification at any level.

### Maintaining System Certification

#### Critical Care EMT-Paramedic (EMT-P)/Prehospital RN (PHRN)

- *Current* AHA Healthcare Provider or ARC Professional Rescuer or ARC Professional Rescuer CPR card
- PHTLS, ITLS, TNCC, TNS or BTLS
- ACLS
- PEPP, PALS or ENPC
- CCEMTP, FP-C, CCP-C, or other approved coursework
- Active member of Memorial EMS System agency
- Successfully complete annual System protocol testing and skills evaluation

#### Registered Nurse (RN)

- *Current* AHA Healthcare Provider or ARC Professional Rescuer or ARC Professional Rescuer CPR card
- PHTLS, ITLS, TNCC, TNS or BTLS
- ACLS
- PEPP, PALS or ENPC
- CCEMTP, CEN, CCRN, CFRN or CTRN
- Active member of Memorial EMS System agency
- Successfully complete annual System protocol testing and skills evaluation

## Provider Responsibilities (continued)

### Expanded Scope EMT-Paramedic (EMT-P)/Prehospital RN (PHRN)

- *Current* AHA Healthcare Provider or ARC Professional Rescuer or ARC Professional Rescuer CPR card
- PHTLS, ITLS, TNCC, TNS or BTLS
- ACLS
- PEPP, PALS or ENPC
- Active member of Memorial EMS System agency
- Successfully complete annual System protocol testing and skills evaluation at the Expanded Scope level
- Minimum 2 years experience

### EMT (B, I or P)/Prehospital RN (PHRN)

- *Current* AHA Healthcare Provider or ARC Professional Rescuer or ARC Professional Rescuer CPR card

Maintaining of current certifications and tracking of expiration dates is ultimately the responsibility of the individual provider. Agency training officers will be *assisting* with monitoring these certifications and reporting to the EMS Office. However, these officers are not *responsible* for any certifications other than their own.

Failure to maintain *current* certification in CPR, ACLS, ITLS/PHTLS/TNCC/ TNS/ BTLS, PEPP/PALS/ ENPC, and CCEMTP/ FP-C/ CCP-C (paramedic or PHRN) or CEN/CCRN/CFRN/CTRN (RN) or any other System certification may result in **suspension** of the individual in violation. Suspended individuals will remain on suspension until proof of current certification is presented to the EMS Office.

### Summary of Re-licensure Requirements

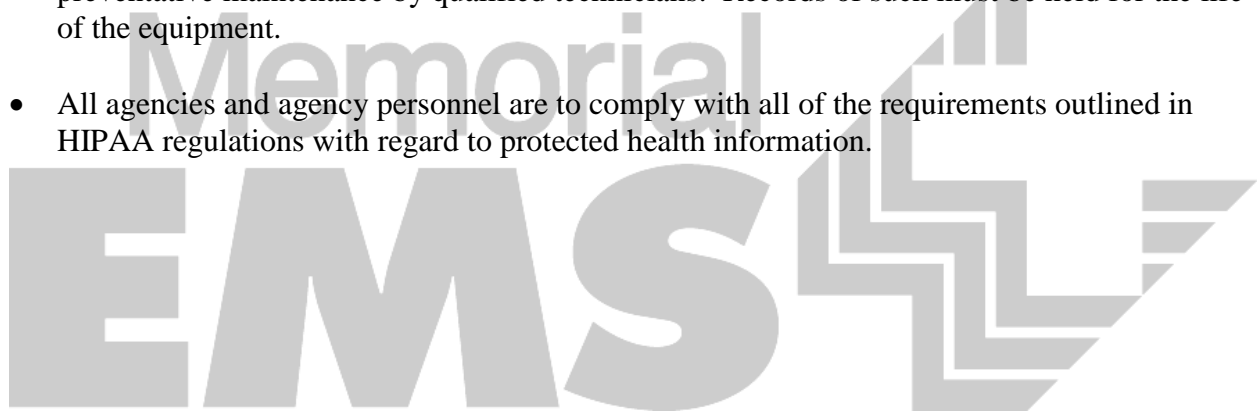
#### Critical Care EMT-Paramedic (EMT-P) Prehospital RN (PHRN) Registered Nurse (RN)

- The initial credentially requirements are required to be maintained without lapse during the period of service in the Critical Care Role, additionally
- License/ certification requirements may vary based on licensing/ certifying body. At minimum, twelve (12) hours continuing education, seminars, and workshops addressing adult and pediatric critical care must be completed annually in order to be on track for renewal.

## Provider Responsibilities (continued)

### Reporting Responsibilities and Maintenance

- Comply with Memorial EMS System Quality Assurance Plan, including agency self-review, timely submission of incident reports, timely submission of patient care reports, maintain controlled substance security logs and usage tracking forms. Logs must be made available upon request of EMS Office personnel.
- Maintain glucometer logs. Testing should be done a minimum of once per week, any time a new bottle of strips is put into service and any time the glucometer is dropped. Glucometer logs should be kept in the ambulance (or other vehicle) and must be made available upon request of EMS Office personnel.
- All electronic equipment used for patient care must be maintained based on manufacturer's recommendations. Equipment needs to be evaluated through regularly scheduled preventative maintenance by qualified technicians. Records of such must be held for the life of the equipment.
- All agencies and agency personnel are to comply with all of the requirements outlined in HIPAA regulations with regard to protected health information.



## Substance Abuse Policy

The Memorial EMS System considers substance abuse (drug and/or alcohol dependency) to be a health problem and will assist any System provider who becomes dependent on drugs and/or alcohol. The System, and ultimately our patients, will suffer the adverse effects of having a CCT care provider whose work performance and attendance are below acceptable standards. Any employee whose substance abuse problems jeopardize the safety of patients, co-workers or bystanders shall be deemed “unfit to work”. Any CCT care provider involved in the Memorial EMS System who voluntarily requests assistance with a personal substance abuse problem will be referred to the EMS Medical Director for assessment and referral for treatment when necessary.

### Testing for Drugs & Alcohol

*The Memorial EMS System does not require employees to submit to blood and/or urine testing for drugs and/or alcohol as a routine part of their employment. However, individual agencies may require testing as part of the application process.*

Any CCT team member or associated healthcare provider may contact the EMS Medical Director (or designee) if he/she has reasonable cause to suspect that a co-worker is under the influence of drugs and/or alcohol while on duty. The EMS Medical Director may choose to require the System provider to submit to a blood/ breathe alcohol test and/or blood/urine toxicology screening. The cost of this testing procedure may be billed to the provider’s agency, or in the case of a student, the requesting agency. Disputes related to billing of drug testing should not delay the procedure(s).

1. If a System provider who is required to submit to testing for drugs and/or alcohol refuses to cooperate, he/she will be subject to disciplinary action for insubordination (up to and including termination from the System).
2. Anyone caught tampering with, or attempting to tamper with his/her test specimen (or the specimen of any other Prehospital care provider) will be subject to immediate termination from the System.
3. If any of the test results are positive, the EMS Medical Director will interview the provider. The EMS Medical Director will consult with the provider’s agency to determine if referral to an assistance program shall occur.
4. **The CCT team member’s privilege of serving in the CCT capacity will be suspended for a minimum of 6 months for the first offense. Any subsequent positive test will result in immediate termination from the System.**

## Substance Abuse Policy (continued)

### Testing for Drugs & Alcohol (continued)

- The progress of employees with substance abuse problems who have been referred to an assistance program will be closely monitored by their agency/employer and the EMS Medical Director. The provider must successfully complete the entire required rehabilitative program and maintain the preventative course of conduct prescribed by the assistance program. He/she must attend the appropriate after-care program(s) and provide verification of compliance with the program requirements, including additional drug testing as determined by the EMS Medical Director and the agency/employer.
5. If the test results are negative, a conference with the EMS Medical Director and the provider's agency/employer will be held to determine what future action, if any, will be taken.

The use, sale, purchase, transfer, theft or possession of an illegal drug is a violation of the law. *Illegal drug* means any drug which is (a) not legally obtainable or (b) legally obtainable but has not been legally obtained. The term *illegal drug* includes prescription drugs not legally obtained and prescription drugs legally obtained but not being used for prescribed purposes. Anyone in violation will be referred to law enforcement, licensing and/or credentialing agencies when appropriate.



## Complex Patient Management

In order to appropriately meet the needs of that patients at each level of the Critical Care Transport program, the providers, especially at the Tier II level, must be very diligent in their assessment of the situation and the likely and potential deterioration of the patient's condition when determining if transporting the patient is within their capabilities. While the scope of Tier II and Tier III are very similar, the complexity of the patient with more than one critical care intervention is when a Tier II crew must defer to a Tier III crew.

A Tier II crew can transport any patient meeting Tier II criteria in these protocols as long as **there is no more than one (1) intervention needed at the Tier II level.** If there are two or more interventions needed at or above the Tier I (Expanded Scope) level or any Tier III criteria, then that patient requires a Tier III crew for transport.

For example, if a patient has both a new chest tube and was just intubated then the patient has two critical care interventions. That specific patient would require a Tier III Crew.

If there are any questions if a patient can be transported Tier II contact the EMS Medical Director, EMS System Manager or EMS Coordinator.

The following medications are only allowed at the Tier III level.

- Nitroprusside
- Milrinone
- Isoproterenol
- Mannitol
- Phenylephrine
- Vasopressin (infusion)
- Procainamide

**B. General Assessment and Patient Care Procedures**



## Patient Care Overview

### Tier II & Tier III

The goal of Critical Care Transport under the Memorial EMS System is to provide safe, appropriate transportation for critically ill or injured patients who have been evaluated in a hospital facility and their condition deems transfer to a higher level of care is necessary for continued treatment. The following Critical Care Manual is to provide a guideline for standard of care when online Medical Control is not required. Medical Control is always available during the initial patient assessment and transport phases of care.

### Assessment

The Critical Care Team will be comprised of either a Registered Nurse, EMT-Paramedic/Pre-Hospital Registered Nurse (each with additional training/ certifications) and an EMT of any level at the Tier III level or an EMT-Paramedic/Pre-Hospital Registered Nurse (each with additional training/ certifications), an Expanded Scope Paramedic with a minimum 2 years' experience and an EMT of any level. While the providing Critical Care treatment, the team should always work as a team and maintain a constant path of communication. In most scenarios the members of the team will handle specific responsibilities based on their licensure, experience and the needs of the patient. While a significant degree of overlap exists between the roles of the Registered Nurse and the EMT-Paramedic/PHRN, certain procedures will be required of only the Registered Nurse or only the EMT-Paramedic/PHRN.

### Treatment and Interventions

1. Standard Precautions and PPE will be utilized at all times during patient care. Enhanced PPE may be deemed necessary while caring for certain patient conditions or while performing certain patient interventions.
2. Prior to any intervention by the Critical Care Team a basic assessment of the patient must occur. This assessment must include
  - a. Assessing the patency of the airway or airway adjunct.
  - b. Assessing the effort of breathing including lung sounds, respiratory rate, SaO<sub>2</sub> or ETCO<sub>2</sub>.
  - c. Assessing circulation including pulse rate and quality, blood pressure and any interventions that affect circulation.
  - d. Assessing the patient for any injuries or deficits. This includes a head to toe assessment of focused physical exam.
3. Report should be received from the transferring RN/LPN/MD/ Midlevel provider including any transfer orders, accepting physician and accepting facility. If preliminary room assignment is given, that should be verified during transport when an update on patient condition and ETA are given fifteen minutes prior to arrival at destination.

## Patient Care Overview (continued)

4. Prior to or immediately after the patient is moved to the CCT stretcher the following interventions must be started or transitioned to the CCT equipment
  - a. Supplemental Oxygen
  - b. Cardiac monitor, blood pressure and oxygen saturation monitoring equipment. These should be documented every fifteen minutes or less and include respiratory rate. Monitoring strips and waveform capnography graph should be printed at the beginning and end of transport, at minimum.
  - c. Non-Invasive Blood Pressure Monitoring (NIBP) is required on all patients unless Invasive Blood Pressure Monitoring (IBP) is utilized.
  - d. ETCO<sub>2</sub> is required for patients who have a I-Gel, endotracheal tube, or cricothyrotomy/ quick trach in place or who are receiving CPAP or BiPAP. Additional protocols will also require ETCO<sub>2</sub>.
5. Prior to and following every patient movement all advanced airway adjuncts must be assessed for correct tube placement by at least two methods and included in the PCR. Continuous waveform capnography is required for any patient with an endotracheal tube.
6. Intubated patients should be ventilated with a transport ventilator unless the patient condition does not allow toleration of the ventilator.
7. Patients at risk of vomiting and/or aspiration should be assessed for placement of a gastric tube.
8. IV access is mandatory unless specific condition protocol identifies otherwise.
9. Patency of each IV site should be verified prior to transport and prior to any medication administration.
10. Fluid/ Medication administration should be verified and maintained in accordance with patient condition.
11. Fluid/ Medication administration should be done through the use of a Baxter Sigma Smart Pump. All medications should be moved to the CCT equipment and total amount infused prior to move documented by transferring facility.
  - a. The only exception would be fluid and/ or blood administration in the adult patient where rapid infusion is required.
12. Patients at risk for hemodynamic instability should have two large bore IV lines.
13. If IV lines are not possible, or the time to obtain is delaying critical interventions intraosseous access should be obtained. A maximum of two attempts are allowed.
14. Invasive lines should be assessed for accuracy and continuously monitored.
15. Patients should be assessed for comfort prior to and after every move. This includes
  - a. Pain assessment and management per protocol.
  - b. Positioning and warmth/coolness.
  - c. Patients should be reassessed after every intervention so to recognize changes and trends in the patient condition.
16. If transporting patients under the age of 16
  - a. Contact with **Medical Control** is required.
  - b. Weight must be verified by Broslow Tape for patients under 10 years of age.
  - c. Temperature and blood glucose must be assessed.

**Patient Care Overview (continued)**

17. The CCT team is responsible for ensuring
- a. Patient family has had the opportunity to see the patient prior to transport.
  - b. Information regarding transport destination has been provided to on-site family.
  - c. Patient information and privacy is respected and maintained.
  - d. All documentation for the transferring facility is taken with the patient. Ideally this would include digital copies of radiology procedures.
  - e. Providing complete report to the receiving nurse/team.
  - f. Completing of the Patient Care Report following every transport.
  - g. A copy should be provided to the receiving facility.
  - h. The PCR shall include copies of all strips printed during care of the patient. Strips should be labeled with name and date of birth clearly noted.



## Medical Control Authority

### Tier II & Tier III

The transport of patients from facility to facility creates unique challenges for a transport provider. Traditional EMS providers function based on written protocols with the ability and situations where they are required to contact **Medical Control**. Any care that is given prior to their arrival is either basic first aid or by providers functioning under the same or similar Prehospital Care Protocols.

When arriving at a hospital facility to transport to another hospital facility, the patient may be at any point within the treatment algorithm/protocol based on the transferring facility's capabilities and other situations at the time of transfer. The CCT team should always function within their respective scopes of practice. The following *Critical Care Manual* should serve as a guide of care.

#### Orders for Transport

When arriving at the transferring facility, the CCT team should review all patient records and the results of any diagnostic tests. Additionally the CCT team should perform their own assessment of the patient.

The facility transferring the patient should provide to the Memorial EMS CCT team the orders for treatment that is to occur during transport. This is to be continued through transport unless a change is detected in patient condition. These orders are to be written down and signed by the transferring physician. The orders should be reviewed for clarity prior to the CCT team assuming care of the patient.

If at any time the Memorial EMS CCT team feels that the orders are inappropriate or outside their scope of practice they are to contact **Medical Control** at Memorial Medical Center Emergency Department immediately. The only situation that would supersede immediate contact with **Medical Control** would be the need for life saving intervention. Any deviation from written orders shall be reviewed by the agency QA officer as well as forwarded, in writing, to the Memorial EMS Critical Care Transport Coordinator within twenty-four (24) hours.

#### Direct Medical Control

There are specific procedures in this manual which require direct **Medical Control**. These procedures/ medications have a notation identifying that Medical Control is required. Medical Control is to be contacted prior to the initiation of such procedures/ medications. Any time such a procedure is completed without prior Medical Control authorization the situation shall be reviewed by the agency QA officer as well as forwarded, in writing, to the Memorial EMS Critical Care Transport Coordinator within twenty-four (24) hours.

## **Medical Control Authority (continued)**

### **Potentially Unstable Transports**

It is the expectation that the transferring facility will do everything within their capacity to stabilize the patient prior to transport. If, in the opinion of the Memorial EMS CCT team, the patient could be further stabilized by interventions within their scope of practice, the delay versus the benefit must be weighed by the transferring physician, Memorial EMS CCT team, accepting physician and, if needed, Medical Control.



## Previously Initiated Medications

### Tier II & Tier III

It is the expectation that the transferring facility will do everything within their capacity to stabilize the patient prior to transport. However, the capabilities of a facility has some bearing on their ability to rapidly stabilize the patient. Unless contraindicated, treatment with previously initiated medications should be continued by the CCT team. If additional medications are warranted, the CCT team should consult their protocols, Medical Control, transferring physician and/ or receiving physician regarding those additional interventions.

### Assessment

In addition to general patient assessment, all medications should be assessed by the CCT team to validate that

1. Medications being administered and reason for it's particular use
2. Concentration of medication,
3. Rate of infusion and validate this is within limits of transport orders,
4. Total medication that has already been infused.

### Treatment and Interventions

1. All medication infusions will be administered by IV pump. The only allowable exception to this is IV fluids and blood products that are being given for rapid infusion.
2. The information from the transferring facility pump must be entered into the CCT pump.
  - a. The infusion must be stopped.
  - b. The infusion tubing should be completely removed from the patient.
  - c. The infusion must be removed from the transferring facility pump.
  - d. The infusion tubing should be removed and the Baxter Sigma Smart pump 10 gttp tubing applied.
  - e. The Baxter Sigma Smart pump 10 gttp tubing should be primed and loaded into the CCT pump.
  - f. The IV site should be flushed prior to the new line being connected.
  - g. The CCT line should be attached to the patient.
  - h. The CCT pump should be started.
  - i. The RN at the transferring facility will validate that the information has been transferred from the original pump to the CCT pump.
3. Only medications listed on a Drug Compatibility Chart (to be stored in medication bag) are allowed to be hung as a primary and secondary infusion or through the same IV site.
4. The process in #2 should be followed for every medication infusion.
5. If any inconsistency or potential error in the labeling of a previously mixed medication, the CCT crew is to remix the medication and hang the new infusion.



## Previously Initiated Medications (continued)

6. The Memorial EMS CCT protocols should be utilized to validate the ranges of previously established medications.
7. All Infusions should be secured; special attention needs to be paid to infusions in glass bottles to secure them during movements.
8. The CCT team should calculate to ensure that they have enough medication for the entire transport and patient transition time prior to departure from transferring facility.
9. Memorial EMS CCT can continue narcotic or sedation infusions if started by transferring facility if approved by protocol or direct **Medical Control**. If additional medication is needed and infusion completes, IVP medications should be utilized.

### Pearls

- Every medication has the potential to cause allergic reactions.
- Many medications are incompatible with other medications. Because of this potential, additional medications should be given through separate IV lines. If this cannot be accomplished, the infusion must be stopped, tubing flushed, injection given, and tubing flushed again.



## Pain Control Protocol

### Tier II & Tier III

Pain, and the lack of relief from the pain, is the most common complaint among patients. Pain control can reduce the patient's anxiety and discomfort, making patient care easier. The patient's severity of pain must be properly assessed in order to provide appropriate relief. Managing pain clinically in the inter facility setting will provide greater patient care. Special attention must be paid to this as the patient is being taken from the controlled environment of the transferring facility to the mobile environment involving multiple moves and transport.

### Assessment

1. Assess level of pain using the Pain Assessment Scale (0-10) or the Wong-Baker Faces Pain Rating Scale.
2. Place patient in a position of comfort if at all possible.
3. Reassure the patient.

### Treatment and Interventions

1. Consider ice or splinting.
2. Reassess level of pain using the approved pain scale.
3. Care should also focus on the pharmaceutical management of pain.
4. Pain medication can be given in situations where the patient still requires additional doses and the systolic BP > 90mmHg.
5. IVP medications can include
  - a) **Morphine Sulfate:** 2-5mg IV every **5 minutes** to reduce the patient's anxiety and severity of pain. If unable to establish IV access, may administer Morphine 2-5mg IM every **15 minutes**.
  - b) **Ondansetron (Zofran):** 4mg IV over **2 minutes** or IM **for nausea and/or vomiting**. May repeat in 15 minutes with additional 4 mg IV.
  - c) *If the patient is allergic to Morphine or if Morphine is not effective:*
  - d) **Fentanyl:** 50mcg IV over **2 minutes** for pain. Fentanyl 50mcg IV may be repeated one time in **5 minutes** to a total of 100mcg. If unable to establish IV access, may administer Fentanyl 50 mcg IM. May be repeated one time in **15 minutes** to a total of 100mcg.
  - e) **Hydromorphone:** 0.5mg-1mg IV. This may be repeated only once total.
  - f) **Ketamine:** 30 mg IV (patients over age 15 only) after initial Opioid administration. May repeat in **15 minutes**.
9. Narcan 2.0 mg IV/ IN should be available at all times.
10. Contact Medical Control if prolonged transport and have maxed out narcotic dose on protocol.

## Pain Control Protocol (continued)

### Wong-Baker Faces Pain Rating Scale



### Pearls

- Monitor the patient for respiratory depression when administering narcotics.
- Blood pressure should be monitored closely – check 5 minutes after narcotic administration (and prior to administering repeat doses).
- Verify that the patient is not allergic to the pharmaceutical agent prior to administration.
- Patients with a head injury / ALOC or patients with unstable vital signs **should not receive pain medications without direct order from Medical Control.**
- **In patients with known renal failure, the Fentanyl dose must be reduced to 25mcg. The dose may be repeated one time to a maximum dose of 50mcg.**
- **Lidocaine:** 30mg IO (slowly) to reduce discomfort from infusion may be given IO to conscious patients experiencing discomfort from IO infusion.

## Patient Sedation Protocol

### Tier II & Tier III

Situations will exist where safe management and transportation of the patient will require sedation of the patient. This could be to prevent the patient from further injuring themselves during transport or to support the sedation needed for airway maintenance.

### Assessment

1. Assess for any causes of anxiety, confusion or other conditions that can be corrected.
2. Attempt verbal reassurance to calm patient.
3. Ensure that the patient can be safely transported by the CCT.
  - a. If uncertain the CCT can safely transport the patient, seek restraint order for transport.

### Treatment and Interventions- Sedation

1. **Midazolam:** 2.5-5mg IV/IN/IM to reduce the patient's anxiety. May repeat in 5 minutes if needed. If giving IV, give slowly over 2 minutes. Watch respiratory status and have bag valve mask ready.
2. **Lorazepam:** 1-4 mg IV. May repeat every 15 minutes.
3. **Diazepam:** 2-10 mg IV/IM. May repeat every 10 minutes.

### Treatment and Interventions- Sedation of the Intubated Patient

1. **Propofol:** Continue IV infusion established at transferring facility. Infusion can be increased by 5-10 mcg/kg/min every 5-10 minutes until desired sedation is achieved. Infusion rate parameters are 5-55mcg/kg/min.
2. **Midazolam:** 2.5-5mg IV/IN/IM to reduce the patient's anxiety. May repeat in 5 minutes if needed. If giving IV, give slowly over 2 minutes.
3. **If paralytic is needed in addition to sedation (On Call Critical Care Medical Control must be contacted before paralytic is used)**
  - a. **Rocuronium:** 1 mg/kg or 100 mg (one time push) Onset 1-2 minutes.

### Treatment and Interventions- Excited Delirium

1. Use extreme caution to provide for crew safety.
2. Have restraints ready. Ensure you have enough providers to complete restraint procedure.
3. **Ketamine:** 1mg/kg IVP or 2 mg/kg IM. May repeat X 1 if necessary.
4. Prepare to provide airway and ventilatory support.

## Use of Advanced Access

### Tier II & Tier III

Patient's with certain ongoing medical problems may have an Implanted Subcutaneous Port (ISP). If the port is accessed via steril technique by the transferring facility and not signs or infection or infiltration exist, the CCT crew can continue to use the port. If any concerns the crew should move to obtaining intraosseous access utilizing pain medications as needed.

### Tier III

In certain situations the CCT team may be called to transport a patient who the transferring physician has inserted a central line. The transferring facility may or may not have accessed the line for medication/ fluid administration prior to arrival of the CCT team.

### Accessing Central Venous Catheters

1. Special attention should be paid to maintaining aseptic technique.
2. Wear clean gloves.
3. Scrub the injection cap (e.g., needleless connector) with an appropriate antiseptic (e.g., chlorhexidine, povidone iodine, or 70% alcohol), and allow to dry (if povidone iodine is used, it should dry for at least 2 minutes).
4. Access the injection cap with the syringe or IV tubing (opening the clamp, if necessary).

### Flushing Technique

1. Single-use flushing systems (e.g., single-dose vials, prefilled syringes) should be used.
2. Access the catheter as outlined above, maintaining aseptic technique.
3. Use a syringe with size 10 mL or greater.
4. Flush the catheter vigorously using pulsating technique and maintain pressure at the end of the flush to prevent reflux.
5. Positive pressure technique (may not apply to neutral-displacement or positive-displacement needleless connectors):
  - a. Flush the catheter, continue to hold the plunger of the syringe while closing the clamp on the catheter and then disconnect the syringe.
  - b. For catheters without a clamp, withdraw the syringe as the last 0.5-1 mL of fluid is flushed.

## Blood Administration

### Tier II & Tier III

Severely ill of injured patients will greatly benefit from the administration of blood products as soon as they can be administered. Ideally, this would be started at the outlying hospital and continued by the CCT team. In some situations the blood products may not be available prior to the CCT team arrival. In such instance, initiation by the CCT team would be of great benefit to the patient.

### Assessment

Patients who are candidates for blood product administration include

1. Adults who are, or suspected to have acute blood loss.
2. Are still considered unstable after administration of 2 liters Normal Saline.
3. SBP less the 90mmHg or other clinical signs of shock (AMS, tachycardia, pallor, delayed capillary refill, etc.)
4. Who have had 2 boluses of 20mL/kg without stabilizing of condition.
5. Other clinical signs of shock (AMS, tachycardia, pallor, delayed capillary refill, etc.)

Prior to administration, and every 15 minutes afterward, the patient should be assessed for

1. Complete set of vital signs, including temperature
2. Skin condition
3. Lung sounds
4. Previous transfusion history
5. Current fluid resuscitation status
6. IV site
7. Adults 18ga or larger (20ga if not infusing PRBCs)
8. IV site patency
9. IV site dedication as only being used for blood product administration
10. Include in the documentation any blood typing information obtained at the transferring facility.
11. If any blood products are being taken with patient, maintain products in cooler on ice for transport. Document time units were accessed from Blood Bank. If unused during transport, these should be turned in at receiving facility Blood Bank.

### Treatment and Interventions

1. Appropriate PPE should be worn by the CCT team member performing the intervention. Prior to any intervention, if patient condition allows, the procedure should be explained to the patient.

## Blood Administration (continued)

2. Remove blood products from cooler. Verify temperature of 2-8 degrees Celcius. Once removed from 2-8 degree Celcius environment, products must be administered or discarded within four hours.
3. The following information must be confirmed by at least two health care providers
  - a. Patient's name (this could be a John or Jane Doe assignment)
  - b. Patient's blood type
  - c. Type of blood products
  - d. ABO type of blood products
  - e. Unit number and expiration
4. The two health care providers who verified should sign all appropriate documentation. This should also include the time the infusion began.
5. Infusion rates vary
6. Begin at slower rate and closely monitor for signs of reaction.
7. Infusion can be sped up after no signs of reaction are seen
8. Blood products can be infused with the assistance of a pressure bag so long as the pressure in the bag does not exceed 300mmHg for adults.
9. If reaction is noted
  - a. Immediately stop the transfusion
  - b. Remove all tubing associated with the infusion from the patient
  - c. Reassess patient.
  - d. Treat any complaints of patient.
  - e. Deliver all blood and delivery devices to receiving facility.
10. Blood products should be administered with
  - a. 10 gtt Baxter Sigma Smart Pump tubing
  - b. Leukocyte reduction filter
  - c. Piggyback 1000 mL Normal Saline
  - d. Rate based on transfer orders.
  - e. Rate can be increased to wide open and pressure bag utilized if patient condition necessitates.
11. When infusion is complete, flush IV site with Normal Saline.
12. Document in the PCR
  - a. Type of blood product
  - b. Unit number
  - c. Time transfusion was started and ended
  - d. Total volume and rate infused
  - e. Signs or lack of signs of reaction
  - f. Complete vital signs at completion of transfusion

**Blood Administration (continued)**

13. Consider

- a. **Diphenhydramine:** 25-50 mg IV/IM if signs of allergic reaction noted.
- b. **Furosemide:** 20 mg IV/IO after each unit for adult patients demonstrating any signs of CHF.
  - i. If patient with penetrating trauma < 3 hours since injury, and signs of hypovolemic shock see *TXA Protocol*.





## Temperature Monitoring

### Tier II & Tier III

Both medical and trauma patients can experience decreases and elevations in temperature that can be detrimental to patient care and patient outcome. Additionally, on some occasions, treatment includes controlling the patient's temperature at a lower than normal value. Therefore, the ability to monitor patient temperature during transport becomes a necessary component of the CCT team's assessment resources.

### Assessment

Temperature monitoring should be considered on any patient. Temperature monitoring is required on

1. Patients suffering from hypo- or hyperthermia.
2. Patient where induced hypothermia has been instituted post cardiac arrest.
3. Any patient with a GCS < 8.

Temperature monitoring can be accomplished with

- Esophageal tubes
- Skin probes
- Urinary catheters

### Treatment and Interventions

1. To utilize **Skin Probe**
  - a. Determine baseline temperature from transferring facility
  - b. Connect temp cable to monitor and connect disposable skin temp probe to cable.
  - c. Identify desired location.
    - i. Central body core
    - ii. Not over a bony prominence
  - d. Clean site with alcohol skin prep
  - e. Remove adhesive backing from probe
  - f. Ensure probe adherence and monitoring.
2. Alternate method for monitoring skin temperature
  - a. Utilize disposable forehead monitor
  - b. Adjust to determine core temperature is not adjust by device
3. To utilize **Esophageal Probe**
  - a. Patient must have endotracheal tube or I-Gel in place.
  - b. Determine baseline temperature from transferring facility.
  - c. Connect temp cable to monitor and connect disposable esophageal temp probe to cable.
  - d. Pediatric size probe will be used on all patients unless copious amounts of vomitus have been experienced.

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Intended recipients will be notified of updates after initial distribution

## Temperature Monitoring (continued)

- e. Lubricate tip of probe with surgical lubricant.
  - f. Insert the probe through mouth and advance to desired depth.
  - g. Optimal placement is in the lower 25% of the esophagus. (Measuring to manubrium instead of Xiphoid Process.)
  - h. Laryngoscope blade can be used to assist placement.
4. To utilize **Urinary Catheter**
- a. No changing of urinary catheter is allowed.
  - b. If transferring facility has placed a urinary catheter compatible with CCT team monitoring equipment monitoring of temperature via urinary catheter is allowed.
  - c. If urinary catheter has not been placed by transferring facility, a urinary catheter with temperature monitoring capabilities can be placed by the CCT team.
    - i. Sterile technique must be strictly adhered to.
  - d. Determine baseline temperature from transferring facility
  - e. Connect temp cable to monitor and connect disposable urinary catheter temp probe to cable.



**C. Patient Care Procedures-Respiratory**



## Bronchospasm

### Tier II & Tier III

Asthma, emphysema and chronic obstruction pulmonary disease (COPD) are all medical conditions that significantly reduce the patient's ability to properly exchange air. While each disease impacts a particular area of the respiratory system, treatment for these diseases tends to overlap.

Asthma is a restrictive pulmonary disorder that is often exacerbated by irritants, secretions, airway edema or exertion. Key to the treatment of the asthma patient is the ability to dilate the narrowed airways to improve air exchange.

Emphysema is a more chronic disease where damage has occurred to the alveoli structure, reducing their ability to adequately exchange air. Of importance in treatment is allowing for the full expiration of each breath to occur after each inspiration.

COPD (also referred to as Chronic Bronchitis) is a disease that affects the bronchi. Increased secretions interfere with the air flow into the alveoli. As a result the alveoli receive less than optimal volume of air to exchange leading to hypoxia and hypercarbia.

### Assessment

Assessment of all respiratory distress patients should include focus on

- The events leading up to current status
- Comparison to previous attacks
- Associated symptoms
- Compensation methods being utilized, and success of those methods
- Questioning what has worked most successfully in the past for the patient
- Has the patient ever improved through the use of CPAP or BiPAP?
- Has the patient ever required intubation?

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Place patient in semi-Fowlers position or higher if patient can tolerate.
3. Administer 100% Oxygen via NRB. If unable to tolerate NRB, reduce to cannula.
4. Secure advanced airway as needed based on *Advanced Airway/RSI Protocol*.
5. Be alert to changes in patient condition that will require securing advanced airway.
  - a. If advanced airway is needed PEEP 5-15 cmH<sub>2</sub>O.
6. If SBP>90 mmHg initiate CPAP or BiPAP based on *Non-Invasive Positive Pressure Ventilation Protocol*.
7. Pain management per *Pain Control Protocol*.
8. **Albuterol:** 2.5 mg in 3 mL via nebulizer. May repeat as necessary. Can be given as in-line neb.

## Bronchospasm (continued)

9. **Ipratropium:** 0.5 mg in 2.5 mL via nebulizer. Can be given as Duo-Neb. May repeat to a maximum of 4 doses.
10. Consider the use of steroids
  - a. **Prednisone:** 60 mg PO.
  - b. **Methylprednisolone Sodium Succinate:** 125 mg IV.
  - c. **Dexamethasone:** 10 mg IV
11. **Racemic Epinephrine 2.25%:** Max single dose 0.5 mL. May repeat every 20 minutes.
12. **Magesium Sulfate:** 2g IV over 20 minutes for severe asthma exacerbation.
13. **Epinephrine 1:1,000:** 0.3 mg IM. **Medical Control** needed for patients over 50 years of age or with known cardiovascular disease.
14. **Terbutaline:** 0.25 mg SQ/IM.



## Capnography Monitoring

### Tier II & Tier III

Capnography is one of several tools/ techniques that can be used to verify endotracheal tube or I-Gel airway placement as well as validate the patient's respiratory status. During transport, capnography is a more reliable and easily assessable tool for verification of airway patency and effects of respiratory support.

All patients with advanced airways under the care of Memorial EMS CCT will be monitored based on their quantitative (waveform) capnography.

### Assessment

Prior to connection of CCT capnography equipment, attention should be given to the trends of the patient prior to CCT team arrival. If capnography has already been utilized, a good wave form pattern should be established by the transferring facility. This can be used as a comparison after the patient has been transferred to the CCT monitor and ventilator.

### Treatment and Interventions

1. Assemble all equipment prior to utilization. If utilizing capnography as a part of rapid sequence intubation, all equipment should be prepped prior to administration of paralytics and/or sedation.
  - a. If required by unit model, zero the unit.
2. Apply ETCO<sub>2</sub> adapter.
  - a. If utilizing for monitoring of conscious patient, nasal cannula can be applied.
  - b. If utilizing with ETT, placement location in circuit should be based on manufacturer recommendations.
3. Resume ventilations (continue spontaneous ventilations).
4. Observe monitor for numeric value and waveform.
  - a. Obtain documentation strip prior to and after each patient move.
  - b. If absent or low numeric value and/or absent or inappropriate waveform
    - i. Immediately verify placement of advanced airway via
      - Colormetric device
      - Direct laryngoscopy
    - ii. Assess circulation for possible cause of low/ absent/ inappropriate readings
  - c. If low/ absent/ inappropriate readings occur prior to departure of transferring facility
    - i. Return patient to original equipment to work to verify tube placement and reason for error.

## Capnography Monitoring (continued)

5. Unless directed otherwise by specific treatment protocol, seek to maintain ETCO<sub>2</sub> range of 35-45 mmHg.

### Pearls

If adjustment in ventilator rate (VR) is needed to improve ETCO<sub>2</sub>

$$\frac{\text{Current ETCO}_2 \times \text{Current VR} = \text{Desired VR to achieve desired CO}_2}{\text{Desired ETCO}_2}$$



## Advanced Airway/ Rapid Sequence Intubation

### Tier II & Tier III

The decision to provide an advanced airway in a patient who still has respiratory effort is not a decision to be made without consideration of all possible options and outcomes of actions. All necessary equipment should be readied before any action beyond BLS ventilation occurs. Additionally, an alternative airway adjunct must be at the patient's bedside prior to initiation of the intervention.

### Assessment

Assessment of the potential advanced airway patient must include

1. Assessment of current airway, adjuncts, and respiratory status
  - a. Look for and address possible causes of airway obstruction.
  - b. For patient with some respiratory effort, rule out other methods to improve respirations. Consider
    - i. Pharmacological agents that could quickly address cause of respiratory difficulty.
    - ii. Positional adjustments that can improve patient's respiratory effort.
    - iii. Patient's emotional state as a contributing factor to respiratory distress.
2. Compare current state to patient's normal based on patient and family ability to provide history.
3. Consider patient's ability and possible likelihood to deteriorate during transport.
4. If airway placement will be needed, strongly consider initiation prior to departure from transferring facility.

### Treatment and Interventions

1. Prior to initiation of any advanced airway intervention
  - a. All needed equipment must to gathered and inspected.
  - b. Back-up airway option must be identified by the CCT team.
  - c. All medications must be checked by both the RN and EMT-P/ PHRN.
2. When CCT team is ready to proceed with airway procedure, medications are to be given. All medications should be identified and drawn up prior to any RSI intervention
3. Sedation to be given second. Only **ONE** should be given
  - a. **Etomidate:** 20 mg IVP
  - b. **Midazolam:** 5 mg IVP. May cause hypotension

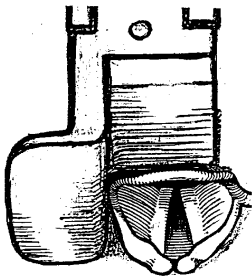


## Advanced Airway/ Rapid Sequence Intubation (continued)

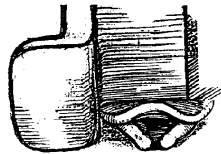
4. Paralytic to be given third. Only **ONE** should be given
  - a. **Rocuronium:** 1mg/kg or 100 mg IVP (one time push)
  - b. **Succinylcholine:** 100 mg IVP
    - i. Consider contraindications for Succinylcholine
5. After paralytic is given the CCT team should be ready to provide ventilatory support. This should be provided by a CCT member other than the one preparing to place the advanced airway.
6. Await paralytic to take effect.
7. Make sure to sedate following intubation according to sedation of intubated patient protocol in 2.E.1

### For Endotracheal Intubation

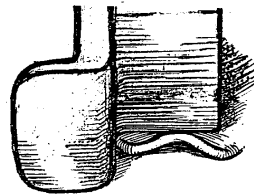
1. Implement basic airway measures.
2. Pre-oxygenate the patient with high concentration oxygen prior to intubation attempt.
3. Conduct a pre-intubation assessment using the *Cormack-Lehane* scale:



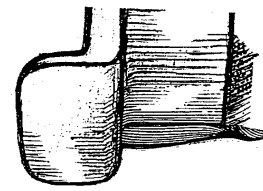
GRADE 1



GRADE 2



GRADE 3



GRADE 4

- If the pre-intubation assessment is **GRADE 3** or **GRADE 4**, consider I-Gel as the first-line device.
- An airway bougie may also be considered for a GRADE 2-4 airways

4. Select the proper tube size (based on patient size) and attach a 10mL syringe. Inflate the cuff to be sure it does not leak (the cuff must be deflated prior to insertion).
5. Insert stylet and bend to the approximate configuration of the pharynx.
6. Lubricate the ETT with a water-soluble lubricant.
7. Have suction, BVM, stethoscope, colorimetric end-tidal CO<sub>2</sub> detector/capnography and commercial ETT holder readily available.
8. Suction the pharynx as needed.
9. Insert the laryngoscope blade into the mouth on the right side, moving the tongue to the left. Follow the natural contour of the pharynx, lifting the tongue (not prying) until you can see the glottic opening.

## Advanced Airway/ Rapid Sequence Intubation (continued)

- a. If you are using a **straight blade** (Miller), insert it until you can see the epiglottis. With the tip of the blade, lift up on the epiglottis so that you can visualize the vocal cords and glottic opening. If needed, have someone gently press down on the cricoid cartilage (Sellick Maneuver) and/or utilize the BURP procedure to aid in visualization of the vocal chords and to help compress the esophagus.
  - b. If you are using a **curved blade** (Macintosh), insert the tip into the vallecula and lift up. This will lift the epiglottis and expose the vocal cords and glottic opening. If needed, have someone gently press down on the cricoid cartilage (Sellick Maneuver) so that you can see the cords well.
10. After visualizing the glottic opening, grasp the ETT with your right hand and advance the tube from the right corner of the mouth. Insert the tube into the glottic opening between the vocal cords, just far enough to pass the cuff of the tube past the opening.

### If spinal injury is considered a possibility

1. Any type of cervical spine manipulation may be dangerous during airway control of the suspected spinal injury patient. Maintain in-line stabilization while attempting airway control. Consider utilizing the I-Gel Airway *in lieu of traditional intubation*.
2. A minimum of two (2) trained rescuers is needed to assure special attention to spinal precautions.
3. One rescuer will apply manual in-line stabilization by placing the rescuers hands about the patient's ears with the little fingers under the occipital skull and the thumbs on the face over the maxillary sinuses.
4. The rescuer performing airway placement should be at the head.

### Placement Verification

1. Verify proper position by ventilating the patient through the tube with a bag-valve device while listening to each side of the chest with a stethoscope to be sure air is entering both lungs.
  - a. Check for inadvertent esophageal intubation by listening for air movement in the epigastric area during ventilations.
2. Utilize a colorimetric end-tidal CO<sub>2</sub> (ETCO<sub>2</sub>) detector or waveform capnography as one confirmation method.
3. If breath sounds are heard on both sides of the chest, no epigastric sounds are heard, colorimetric ETCO<sub>2</sub> detector/capnography indicate proper placement, inflate the cuff with 10mL of air and secure the tube with a commercial ETT holder.
4. If you have inserted the ETT too far, it will usually go into the right main stem bronchus. Therefore, if you hear breath sounds only on the right, you should pull the tube back  $\frac{1}{2}$  inch at a time until you hear bilateral breath sounds. Inflate the cuff with 10mL of air and secure the ETT with a commercial holder.

## Advanced Airway/ Rapid Sequence Intubation (continued)

5. If you hear no breath sounds, you are in the esophagus and must remove the ETT immediately. Repeat above steps.
  - a. If no breaths sounds on second attempt ventilate patient and proceed to I-Gel Airway insertion or continue basic airway control measures.
6. Frequently reassess breath sounds to be sure that the ETT is still in place.
7. Ventilate the patient at a rate of 12 times per minute until ventilator settings can be established.
8. Treat based on *Patient Sedation Protocol* as needed to maintain sedation during transport.

### Use of the Endotracheal Tube Introducer (AKA “Bougie”)

1. The endotracheal tube introducer, AKA “Bougie” is a useful tool to help facilitate difficult intubation. Unlike a stylet, a bougie is inserted independent of the ET tube and is used as a guide, over which an ET Tube may be placed into the trachea. It is used where a difficult intubation is anticipated, or a poor view of the glottis opening has been confirmed on laryngoscopy (*Cormack-Lehane II, IV*).
2. Prepare the endotracheal tube introducer for use: Curve the bougie and ensure the distal tip is formed into a J (coudé) shape.
3. Utilize the laryngoscope as you would do during intubation to obtain the best possible view of the glottis opening. You should always be able to view the tip of the epiglottis and, ideally, the arytenoid cartilages.
4. Advance the bougie, continually observing its distal tip, with the concavity facing anteriorly.
5. Visualize the tip of the bougie passing posteriorly to the epiglottis and (where possible) anterior to the arytenoid cartilages.
6. Once the tip of the bougie has passed the epiglottis, continue to advance it in the mid-line so that it passes behind the epiglottis but in an anterior direction.
7. As the tip of the bougie enters the glottis opening you may feel “clicks” as it passes over the tracheal rings or the tip may stop against the wall of the airways. This suggests correct insertion, although this cannot be relied upon to indicate correct positioning.
8. Hold the bougie firmly in place and pass the endotracheal tube over the proximal end of the bougie.
9. As the proximal tip of the bougie is re-exposed, carefully grasp it, assuming control of the bougie.
10. The ET tube should then be carefully advanced along the bougie and hence through the glottic opening, taking care to avoid movement of the bougie.
11. Once the ET tube is fully in place hold it securely as you slowly withdraw the bougie.



## Advanced Airway/ Rapid Sequence Intubation (continued)

### i-Gel

- The i-Gel is an airway device designed for emergency or difficult airway management in the apneic or unresponsive patient without a gag reflex.
- It is the primary airway of choice for adult and pediatric cardiac arrest patients.
- It is the back-up airway in cases of an unsuccessful intubation attempt.

### Contraindication

- Active gag reflex
- Ingestion of a caustic substance (e.g. gasoline, drain cleaner, etc.)
- Use caution in pregnant females
- Morbid obesity
- Tracheostomy (it will be ineffective)
- Patient less than 30kg (BLS provider restriction only)
- Known or suspected esophageal disease (e.g. esophageal varices)

i-gel size		Patient size	Patient weight guidance (kg)
 3		Small adult	30-60
 4		Medium adult	50-90
 5		Large adult+	90+

### i-Gel Airway Insertion

1. Don appropriate PPE
2. Pre-Oxygenate the patient with 100% Oxygen.
3. Select the appropriate i-Gel size from the chart above.
4. Remove the device from the packaging and check for signs of damage.
5. Place water-soluble jelly in the middle of the cradle packaging.
6. Lubricate the back, sides, and tip of the i-Gel's non-inflatable cuff. Ensure no lubricant is inside the cuff.
7. Grasp along the integral bite block and face the cuff towards the patients' chin.
8. Insert the i-Gel into the mouth in the direction of the hard palate.
9. Glide the device down and back along the hard palate with continuous, gentle pressure until resistance is met.

## Advanced Airway/ Rapid Sequence Intubation (continued)

### i-Gel Airway Insertion Procedure

10. Tape the device Maxilla to Maxilla or use a commercial i-Gel 02 holder for **gentle downward pressure.**
11. Connect the i-Gel to the BVM.
12. Confirm i-Gel placement with ETCO<sub>2</sub> detector or waveform capnography (preferred), auscultation of bilateral breath sounds, and visualizing equal chest rise/fall.
13. Continuously monitor the patient with pulse oximetry, capnography, and cardiac monitor.
14. (**ALS only**) Insert appropriately sized gastric tube if time permits.
  - a. Use a 12Fr gastric tube for I-Gel sizes #2- #5
  - b. Use a 10Fr gastric tube for I-Gel size #1.5

Memorial

### Critical Thinking

- If unsuccessful in placing a Supraglottic Airway, remove the airway and a **second attempt** with the device following the same insertion procedures may be made. If this attempt is unsuccessful, immediately revert to *Basic Airway Control Procedures*.
- Sizes for the i-Gel are based on ideal body weight for the size of the patient.
- A proficient provider can insert an i-Gel in 5 seconds or less.
- Do NOT administer medications via any Supraglottic Airway Device. It is designed as an airway adjunct only and cannot be utilized as a medication route.
- **Warning:** *In order to avoid the possibility of the device moving up out of position prior to being secured in place, it is essential that as soon as insertion has been successfully completed, the i-Gel is held in the correct position until being secured.*
- **Warning:** *Do not apply excessive force on the device during insertion.*
- It is not necessary to insert fingers or thumbs into the patients' mouth during the i-Gel insertion process.
- Supraglottic Airways do not prevent the aspiration of gastric contents.

## Advanced Airway/ Rapid Sequence Intubation (continued)

### If changing from a defective Endotracheal Tube to new Endotracheal Tube

1. Prepare all needed equipment in advance.
2. Hyperoxygenate patient prior to procedure.
3. Remove BVM or ventilator circuit from Endotracheal Tube.
4. Insert lubricated Bougie Tube into ventilation port of Endotracheal Tube (approximately 30 cm.)
5. Deflate bulb on Endotracheal Tube.
6. Remove Endotracheal Tube while maintaining position/ location of Bougie tube.
7. Replace with Endotracheal Tube as outlined above.
8. Confirm placement and secure tube.



## Pneumothorax Management

### Tier II & Tier III

A pneumothorax/ hemopneumothorax is a life-threatening condition that requires prompt identification and treatment to prevent compromise of ventilation and circulation. While the pneumothorax/ hemopneumothorax is more likely to develop shortly after the injury occurs or after airway interventions, it can develop at any time. The CCT team must work quickly to identify the condition, intervene and look for possible causes to prevent further compromise.

### Assessment

Patients suffering from a pneumothorax/ hemopneumothorax will typically present with several of the following signs and symptoms. If readily available, review radiographic images to verify patient condition as well as placement of any interventions.

Signs and symptoms of tension pneumothorax / hemopneumothorax include:

- Restlessness and agitation
- Severe respiratory distress
- Increased airway resistance with ventilations
- JVD
- Tracheal deviation
- Subcutaneous emphysema
- Unequal breath sounds
- Absent lung sounds on the affected side
- Hyper resonance to percussion on the affected side
- Hypotension
- Cyanosis
- Respiratory arrest
- Traumatic cardiac arrest

### Treatment and Interventions

If a tension pneumothorax is identified while the patient is in the care of the CCT team:

1. Locate the 5<sup>th</sup> intercostal space in the mid-axillary line on the side of the pneumothorax.
2. Cleanse the site with providone-iodine preps and maintain as much of a sterile field as possible.
3. Attach a 10-20mL syringe to a 2 inch, 14g IV catheter.
4. Puncture the skin perpendicularly, just superior to the 6<sup>th</sup> rib (in the 5<sup>th</sup> intercostal space). Direct the needle just over the 6<sup>th</sup> rib and into the thoracic cavity. A “pop” should be felt as well as a “rush of air” as with the plunger of the syringe moves outward.
5. Advance the catheter while removing the needle and syringe.
6. Attach extension tubing, gate valve and one way valve device from pneumothorax kit.
7. Secure the catheter in the chest wall with a dressing and tape.
8. Monitor the patient **closely** and continue to reassess.

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## Pneumothorax Management (continued)

### If the patient has a closed chest drainage system already in place:

1. Address the immediate needs of the patient. This may include performing a needle decompression, or repeated needle decompressions, on the patient.
2. Work to trouble shoot potential problems with the entire thoracostomy. Verify chest tube is securely attached to patient's chest prior to any patient movement by
  - a. Confirming sutures to the skin are intact.
  - b. Occlusive dressing attached to thoracostomy site, or secure taping of the chest tube to the chest skin.
  - c. Inspect tube for any possible occlusions.
3. Verify the device and tubing is connected to suction for proper drainage.
  - a. Add additional tape as needed.
  - b. Water flow and float ball should tidal with patient's respiratory cycle.
  - c. Continuous bubbling indicates an air leak within the system.
4. Ongoing treatment for closed chest drain system
  - a. Suction will be maintained during transport as it was at the facility.
    - i. Drainage tubes must be clamped while transitioning from suction systems.
    - ii. Verify suction pressure as ordered by transferring physician.
  - b. Note fluid and blood levels in the drainage and water seal compartments.
    - i. Per orders, note the drainage at required increments on the drain and in the PCR.
    - ii. If drainage output of greater than 200ml/hr x4 hours or greater than 150ml/hr x3 hours in elderly, contact **Medical Control** as this may require immediate intervention.
  - c. Closed chest drain system must be maintained at a level lower than the point of insertion on the patient.
5. Chest tubes and closed chest drain systems should be inspected every 15 minutes during transport to insure proper working condition.
6. Consult current patient orders for best patient positioning.

### Critical Thinking Elements

- **Nerve bundles and blood vessels are located under the ribs and puncturing them could cause nerve damage and extensive bleeding. Ensure that the puncture is being made over the top of the 3<sup>rd</sup> rib midclavicular or the 6<sup>th</sup> rib mid axillary.**



## Quick Trach/ Emergency Cricothyrotomy

### Tier II & Tier III

Rare situations produce the potential for extreme airway emergencies. Such situations are typically the result of traumatic injuries (including burns), anaphylactic reasons and or extreme, co-morbid medical conditions. While these cases are exceedingly rare with the airway equipment available to emergency medical providers, the potential exists for a situation where an emergent surgical airway (Quick Trach/ Emergency Cricothyrotomy) is needed. Such situations will require quick decision making as well as consensus among onsite medical providers that the emergent airway is the only option.

Due to the possibility of deterioration in respiratory status, it is imperative that the transferring facility clarify the patient's wishes regarding intubation prior to transport. In accordance with the patient's wishes, the transferring physician, receiving physician and the CCT team need to determine the safest way to maintain the patient's airway during transport.

### Assessment

Utilization of transtracheal ventilation should **ONLY** be utilized if

1. Signs and symptoms of complete airway obstruction/ occlusion.
  - a. This would be indicated also by inability to provide any ventilation via BVM.
  - b. Basic and Advanced Life Support maneuvers to remove obstruction should be attempted prior to movement to emergency airway.
2. Inability to establish an advanced airway (endotracheal tube or I-Gel Airway) after primary and secondary attempts.

### Treatment and Interventions

1. Prep the site by vigorously scrubbing with alcohol or iodine preps.
2. Place the patient in a supine position. If no concerns about cervical spine injury, hyperextend the neck.
3. With gloved hand, maintain constant pressure on the larynx laterally between the thumb and forefinger of non-dominant hand. Releasing this pressure will make landmarks difficult to relocate.
4. Secure the larynx laterally between the thumb and forefinger. Find the cricothyroid membrane (in the midline between the thyroid cartilage and the cricoid cartilage). This is puncture site.
5. Firmly hold device and puncture cricothyroid membrane at a 90-degree angle.

### Quick Trach/ Emergency Crithothyrotomy (continued)

6. After puncturing the cricothyroid membrane, check the entry of the needle into the trachea by aspirating air through the syringe.
  - a. If air is present, needle is within trachea, change the angle of insertion to 60 degrees (from the head) and advance the device forward into the trachea to the level of the stopper. The stopper reduces the risk of inserting the needle too deeply and causing damage to the rear wall of the trachea.
  - b. Should no aspiration of air be possible because of an extremely thick neck, it is possible to remove the stopper and carefully insert the needle further until entrance into the trachea is made.
7. Remove the stopper. After the stopper is removed, be careful not to advance the device further with the needle still attached.
8. Hold the needle and syringe firmly and slide only the plastic cannula along the needle into the trachea until the flange rests on the neck. Carefully remove the needle and syringe.
9. Secure the cannula with the neck strap
10. Apply the connecting tube to the 15 mm connection and connect the other end to the bag-valve-mask with supplemental oxygen.
11. Continue ventilation with 100 percent oxygen and continuously assess the airway and respiratory status.

#### Potential Problems/ Complications

- **The severity of the medical situation will add to the complexity of the procedure.**
- **Subcutaneous emphysema will result after ventilations are applied to an improperly placed airway (too shallow or too deep).**
- **Bleeding is very common due to the large quantity of superficial vessels in the neck.**
- **Too deep of insertion can lead to perforation of the posterior trachea and even the esophagus. Excessive bleeding will result. Placement stopper should always be utilized.**

## Mechanical Ventilation

### Tier II & Tier III

Certain situations exist where mechanical ventilation of the patient is most advantageous to the patient and the treatment/recovery process. As such mechanical ventilation via a transport ventilator is the preferred mechanism over BVM use. Only in rare situations should the BVM be used for ventilation beyond than transitions in bed location or caregiver once the patient has been placed on the transport ventilator.

### Assessment

Assessment of the patient requiring mechanical ventilation should include history of the situation that led to the placement of an advanced airway as well as history of ventilator use prior to this incidence.

#### Pre and Post Move to a Ventilator

1. Assessment of patient should include and be documented in PCR
  - a. Lung sounds in a minimum of 4 lung fields,
  - b. Absence of sounds over the epigastria,
2. Assessment of diagnostic equipment should include and be documented in PCR,
  - a. Current waveform capnography and ET<sub>CO</sub>2 values,
3. Secondary ventilator should be set to identical settings as the primary ventilator,
  - a. If identical settings are not possible, consult with transferring physician and/ or respiratory therapist for orders as close as possible.
4. Waveform capnography and ET<sub>CO</sub>2 should be moved to transport monitor,
5. Ensure readings match previous readings prior to moving patient to secondary ventilator. If unable to match settings, return to primary waveform capnography and ET<sub>CO</sub>2 and troubleshoot prior to ventilator move.
6. Move patient to secondary ventilator.
  - a. Assess patient for compliance. Return to primary ventilator if any issues noted until they can be corrected.

#### Pre and Post Move of Any Patient on a Ventilator

1. Equipment required always at patient's bedside
  - a. BVM
  - b. 10 mL syringe
2. Assessment of patient should include and be documented in PCR
  - a. Lung sounds in a minimum of 4 lung fields,
  - b. Absence of sounds over the epigastria,
3. Assessment of diagnostic equipment should include and be documented in PCR,
  - a. Current waveform capnography and ET<sub>CO</sub>2 values.

## Mechanical Ventilation (continued)

### If Transferring a Patient from a Ventilator at a Transferring Facility

1. Prepare ventilator prior to patient application
  - a. Perform ventilator self test per manufacturer specs.
2. Verify all filters are clean, disposable filters should be new.
3. Attach disposable vent circuit(s).
4. Attach appropriate O2 source.
5. Check circuit for leaks.
6. Ventilator settings should be set to match all settings established at transferring facility.
7. If unable to set identical settings
  - a. Consult transferring physician/ respiratory therapist for alternate settings
  - b. If any question regarding ventilator settings, contact **Medical Control**.

### If Placing a Patient on Transport Ventilator as Initial Ventilator

1. Prepare ventilator prior to patient application
  - a. Perform ventilator self test per manufacturer specs.
2. Verify all filters are clean, disposable filters should be new.
3. Attach disposable vent circuit(s).
4. Attach appropriate O2 source.
5. Check circuit for leaks.
6. If no specific orders are written, initial setting should be based upon the following with the goal of maintaining achieving optimum cycle time and desired minute ventilation.

	Tidal Volume	RR	I/E Ratio	PEEP	FIO2
No Medical History	6 mL/kg**	10-12	1:2	4	1.0
Asthma/ COPD	6mL/kg**	8-10	1:4	4	1.0
ARDS	6mL/kg**	10-12	1:2	4-15	1.0
Hypovolemia	6mL/kg**	10-12	1:2	4	1.0
Closed Head Injury	6 mL/kg**	10-12	1:2	4	1.0
Burn Injury Inhalation	6mL/kg**	10-12	1:2	4-15	1.0

\*\* Must use Ideal Body Weight, not the actual patient's weight. Should not exceed 650-700 mL.

#### Ideal Body Weight Formula

- Men= 50 kg + 2.3 kg for every inch over 5 feet tall.
- Women= 45.5 kg + 2.3 kg for every inch over 5 foot tall.

## **Mechanical Ventilation (continued)**

### **For all intubated patients**

1. Maintain sedation based on Patient Sedation Protocol.
2. Consider placement of gastric tube.
3. Utilize soft wrist restraints to protect against self extubation.
4. Refer to Complex Patients protocol for exclusion criteria for Tier II providers

### **Pearls**

- **Patient should never be off the ventilator > 15 seconds. If troubleshooting of ventilator is needed, BVM should be initiated immediately.**
- **Limits interactions with patient that will cause increased difficulty for patient who has difficulty tolerating vent.**
- **If patient has home ventilator and home ventilator is being requested for use, transferring physician, receiving physician and CCT Team must agree that home vent use is best in this patient situation.**



## Non-Invasive Positive Pressure Ventilation

### Tier II & Tier III

Patients suffering from hypoxia due to obstructive disorders and pulmonary edema face a more expedited recovery in current distress can be corrected by the use of non-invasive positive pressure ventilation (CPAP and/ or BiPAP) before the need for advanced airway develops. The use of an advanced airway in such chronic respiratory patients, leads to a significant difficulty in reversing the patient's dependency on the ventilator.

### Assessment

Patient who may benefit from the use of CPAP or BiPAP typically present with a known history of

- Congestive Heart Failure
- Chronic Obstructive Pulmonary Disease
- Asthma
- Airway structure damage from injury
- Acute situations such as
  - Flash Pulmonary Edema
  - Respiratory distress where the patient is refusing intubation

Clinical presentation of

- Hypoxia despite supplemental O<sub>2</sub>
- Rales/ Rhonchi in lung fields
- Pitting edema in dependent extremities and/ or inability to lie flat
- Hypercarbia or inability to tolerate CPAP pressure- utilize BiPAP

Contraindications

- SBP < 90 mmHg
- Facial, airway or penetrating chest trauma
- Inability to maintain own airway
- Inability to secure good seal to patient's face
- Hemodynamic instability requiring RSI
- Vomiting

## Non-Invasive Positive Pressure Ventilation (continued)

### Treatment and Interventions

1. Ensure patent airway and patient ability to maintain that airway. If patient is not able to maintain airway for transport, take steps to ensure patent airway, up to and including *Advanced Airway/ RSI Protocol*.
2. Initiate appropriate settings for patient condition
  - a. Refer to transferring physician and receiving physician for initial orders.
  - b. Standard is 10 Pressure Support/ 5 cm H<sub>2</sub>O PEEP. FIO<sub>2</sub> at 100%. Can be increased in 2.5 increments to 18 Pressure Support/ 8 cm H<sub>2</sub>O PEEP.
  - c. Check to ensure patient volumes of ventilator at 500-800mL (approximately 5-8 mL/kg TV). Higher volumes are permitted if patient is chronically on higher volumes at home or has a valid Do Not Intubate order.
3. Connect ventilator to O<sub>2</sub> source.
  - a. Source should have >1500 PSI
4. Treat also based on *Bronchospasm Protocol* as needed.
5. If patient has had CPAP or BiPAP mask on for > 1-2 hours
  - a. Remove mask and check to insure no pressure sores are being created for seal.
  - b. Assess oropharynx to see if secretions have led to a need for suctioning in airway.
6. Constant monitoring of the patient is needed to ensure
  - a. Consistent waveform capnography at or better than levels established by transferring facility.
  - b. No decrease in level of consciousness.
  - c. No contraindications have developed.
7. Patients must have appropriately trending ABG or VBG and a stable and non-deteriorating level of consciousness for 1 hour prior to accepting patient for transport. These contraindications need not apply to a patient with a valid Do Not Intubate order.

**D. Patient Care Procedures-Cardiac**





## 12 Lead EKG

### Tier II & Tier III

The 12 and 15 Lead EKG have become the definitive test for timely diagnosis of STEMI. A 12 Lead EKG should be completed on every patient complaining of chest pain/ discomfort, possible referred pain to the neck, shoulders, arm, back or epigastric area or difficulty breathing of suspected cardiac etiology. ST segment elevation may not be seen in EKGs that are obtained early in the onset of symptoms. In such cases a second 12 Lead, 15 Lead or right-sided 12 Lead may be indicated.

### Assessment

If 12 Lead EKG has been completed at the transferring facility, the CCT team should review the findings and evaluate the need for repeated/additional EKG. If patient has diagnosed STEMI note the areas of elevation and reciprocal depression.

Any patient complaining of chest pain/discomfort, difficulty breathing or who has experienced trauma to the chest should have a 12 Lead EKG completed as soon as possible to identify possible cardiac etiology.

### Treatment and Interventions

Appropriate PPE should be worn by the CCT team member performing the intervention. Prior to any intervention, if patient condition allows, the procedure should be explained to the patient.

1. Clean and prep skin. Shave as needed.
2. Apply the limb leads first
  - a. Arm leads should be placed between the shoulder and elbow, not over a bony prominence or large muscles.
  - b. Leg leads should be placed between the hip and ankle, but not over a bony prominence or large muscles.
3. Place the Precordial Leads
  - a. V1 at the 4<sup>th</sup> intercostal space to the right of the sternum.
  - b. V2 at the 4<sup>th</sup> intercostal space to the left of the sternum.
  - c. V3 directly between V2 and V4.
  - d. V4 at the 5<sup>th</sup> intercostal space at the left midclavicular line.
  - e. V5 directly across from V4 at the left anterior axillary line.
  - f. V6 directly across from V4 and V5 at the mid axillary line.
4. Be attentive of patient privacy as much as medically possible. Never use the nipple line as a landmark. Leads should be placed under the breast on the patient chest wall.
5. Encourage patient to lie still, relaxing all muscles and breathing easily.
6. Acquire and print 12 Lead. If assistance in interpretation is needed, forward by telemetry to Medical Control.
7. A copy of the 12 Lead is to be labeled and included in the PCR. Any changes in lead placement should be noted on the EKG and communicated to Medical Control.

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**12 Lead EKG (continued)**

**Suspected Inferior MI**

If CCT team suspects Inferior MI a right-sided EKG may be completed.

1. Precordial Lead placement will change to
  - a. V1 at the 4<sup>th</sup> intercostal space to the left of the sternum.
  - b. V2 at the 4<sup>th</sup> intercostal space to the right of the sternum.
  - c. V3 directly between V2 and V4.
  - d. V4 at the 5<sup>th</sup> intercostal space at the right midclavicular line.
  - e. V5 directly across from V4 at the right anterior axillary line.
  - f. V6 directly across from V4 and V5 at the mid axillary line.
2. A copy of the 12 Lead is to be labeled and included in the PCR. Any changes in lead placement should be noted on the EKG. Included in the labeling should be which version is right-sided chest versus left-sided chest.

**15 Lead EKG**

If the CCT team suspects an Inferior wall MI, posterior or right ventricle involvement, a 15 Lead EKG should be done.

1. Precordial Lead placement will change to
  - a. V4 moved to V4R and is placed at the 5<sup>th</sup> intercostal space, midclavicular line on the right chest.
  - b. V5 moved to V8 and is placed at the 5<sup>th</sup> intercostal space mid scapular.
  - c. V6 moved to V9 and is placed at the 5<sup>th</sup> intercostal space between V8 and spine.
2. A copy of the 12 Lead is to be labeled and included in the PCR. Any changes in lead placement should be noted on the EKG. Included in the labeling should be which version is left sided chest traditional and which is the 15 Lead.

Lead Name & Standard Color			
I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral

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## Hypertensive Emergency

### Tier II & Tier III

A hypertensive emergency exists when blood pressure is elevated to a point where central nervous system, cardiac or renal system dysfunction results. Multiple organ systems can play a role in creating the cause of this crisis. As the body attempts to compensate and return to its own homeostasis, it actually worsens the situation for itself.

### Assessment

Good patient assessment and history will be of great value in assessing the patient suffering from a hypertensive crisis. The patient may have a single complaint, seemingly unrelated to the ultimate cause of the medical emergency. Assessment should include any history that the transferring facility may have available, as well as a detailed physical exam.

For patient with blood pressure of  $>200/130$  regardless of symptoms or  $>180/110$  with

- Acute change in mental status
- New focal neurological deficit
- Acute ischemic EKG changes
- Acute LV dysfunction
- Renal failure (increased serum creatinine)
- Hematuria

Question all female patients age 15-50 if possibility of postpartum hypertension. (Six or fewer weeks post delivery.) If yes

- Verify destination appropriate for treatment of postpartum hypertension patient
- Verify transport orders were reviewed by receiving physician.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Verify manual blood pressures in both arms.
3. Identify and correct possible causes of hypertension. (Pain, medication induced, etc.)
4. Continuously work to identify cause
5. For hypertensive states associated with cocaine, methamphetamine or other stimulants  
**DO NOT USE BETA-BLOCKERS.** Instead treat with:
  - a. **Midazolam:** 2.5mg-5mg IV/IM. May repeat in 3-5 minutes.
  - b. **Lorazepam:** 1-4 mg IV. May repeat in 15 minutes as necessary.
  - c. **Diazepam:** 2-10 mg IV/IM May repeat in 10 minutes as necessary.

## Hypertensive Emergency (continued)

6. If blood pressure of  $>200/130$  regardless of symptoms or  $>180/110$  and complaints of tachycardia, headache, nausea/vomiting or confusion
  - a. **Labetalol:** 10-20 mg IV over 2 minutes. May double the previous dose and repeat PRN. Max total dose 300 mg.
    - i. Labetalol should be used with caution in the bradycardic patient.
  - b. **Hydralazine:** 10 mg slow IV push. May repeat in 20 minutes up to a maximum dose of 40 mg.
  - c. Consider **Nicardipine (Cardene):** Start infusion at 5 mg/hr. Increase by 2.5 mg/hr every 15 minutes to a max of 15 mg/hr.
  - d. Consider **Esmolol (Brevibloc):** Bolus 500 mcg/kg over 1 minute. Then infuse at 50 mcg/kg/min. May increase by 50 mcg/kg/min every 5-10 minutes to a max of 200 mcg/kg/min.
    - i. Esmolol is to be used with caution in the bradycardic patient.
7. Consider **Nitroglycerin infusion:** 10-200 mcg/min. Titrate to SBP and symptoms by 10 mcg/kg/min every 5-10 minutes. Maximum dose 200 mcg/min. **Nitroglycerin is contraindicated in patients who have taken erectile dysfunction medication within the last 72 hours.**
8. Rapid reduction of hypertension is only indicated for AMI, hypertensive encephalopathy and subarachnoid hemorrhage.
9. All other hypertensive cases, BP should be lowered approximately 10% per hour. Treatment should continue to be titrated until symptoms are relieved or 20% MAP is achieved. The target is NOT a normal blood pressure.
10. If hypotension results, discontinue anti-hypertensive, elevate patient's feet, and administer 250 mL bolus of **0.9% Normal Saline**. Repeat as needed to achieve  $MAP \geq 65$  mmHg.

### Tier III

11. If blood pressure of  $>200/130$  regardless of symptoms or  $>180/110$  and complaints of tachycardia, headache, nausea/vomiting or confusion despite above medication treatments
  - a. Consider **Nitroprusside (Nipride):** Start infusion at 0.3 mcg/kg/min. May increase by 0.5 mcg/kg/min every 5 minutes to a max of 3 mcg/kg/min. May increase up to 10 mcg/kg/min for a total of ten minutes and then must reduce.

## Pulmonary Edema/ CHF

### Tier II & Tier III

Flash pulmonary edema is consistent with a significant increase the respiratory difficulty regardless of physical activity. Unfortunately, the left heart damage that already exists is unable to respond to increased need. In attempting to do so, it increases its own oxygen need thereby making the situation an ever worsening cycle. Prompt recognition of the situation and intervention will have significant impact on the long term recovery of the patient. The heart's inability to pump effectively results in an accumulation of fluid, particularly, in the lungs. The fluid accumulation leads to alveolar flooding and a reduced ability to exchange gases at the alveolar level.

### Assessment

Any patient exhibiting signs of heart failure should also be assessed for

- Myocardial Infarction
- Sepsis
- Valve failure/ papillary muscle rupture

Be particularly attentive to

- Respiratory assessment
  - Rales/ wheezes on auscultation
  - Accessory muscle use
  - Respiratory secretions
- JVD even when upright
- Peripheral edema
- Labs
  - Decreased Cardiac Output
  - Increased PA, PCWP, CVP, SVR
- Heart tones may reveal S3 gallop

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Place patient in semi-Fowlers position or higher if patient can tolerate.
3. If SBP>90 mmHg initiate CPAP or BiPAP based on *Non-Invasive Positive Pressure Ventilation Protocol*.
4. Be alert to changes in patient condition that will require securing advanced airway.
  - a. If advanced airway is needed PEEP 5-15 cmH2O.
5. Pain management per *Pain Control Protocol*.
6. For suspected PE
  - a. Sending physician may initiate anti-coagulation. Anti-coagulation therapy may be continued based on sending physician orders.

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**Pulmonary Edema/ CHF (continued)**

7. **Nitroglycerin:** 0.4 mg SL every 3-5 minutes if SBP remains >90mmHg.
  - a. **Nitroglycerin is contraindicated in patients who have taken erectile dysfunction medication within the last 72 hours.**
8. **Nitroglycerin Infusion:** 10-200 mcg/min. Titrate to SBP and symptoms by 10 mcg/kg/min every 5-10 minutes. Maximum dose 200 mcg/min.
  - a. **Nitroglycerin is contraindicated in patients who have taken erectile dysfunction medication within the last 72 hours.**
9. **Furosemide:** 40 mg, or 1 mg/kg, or current daily PO dose given IV.
10. **Enalapril:** 1.25 mg IV **ONLY IF NO** EKG changes that indicate inferior wall damage.

**Tier III**

11. **Milrinone:** 0.25-0.75 mcg/kg/min for cardiogenic shock.



## ACS/ STEMI

### Tier II & Tier III

While mortality from Acute Coronary Syndrome is steadily declining, morbidity and mortality from ACS/STEMI should serve as constant reminders of the medical emergency that exists. Rapid treatment and transport to definitive care should be of the utmost priority.

### Assessment

Assessment should focus on identifying the patient's condition as stable and being transported for continued cardiac evaluation or unstable who is being transported for an acute event that is still ongoing.

Important additional information can be gained in questioning labs obtained prior to transport and significant family history.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Obtain, review or repeat 12 Lead EKG. Consider need for 15 Lead or Right-Sided 12
3. Lead.
4. Place defibrillation patches on patient.
5. **Aspirin:** 324 mg PO. If given prior to CCT team arrival, note previous administration in PCR.
6. **Nitroglycerin:** 0.4 mg SL every 3-5 minutes if SBP remains >90mmHg.
  - a. **Nitroglycerin is contraindicated in patients who have taken erectile dysfunction medication within the last 72 hours.**
  - b. **Nitroglycerin Infusion:** 10-200 mcg/min. Titrate to SBP and symptoms by 10 mcg/kg/min every 5-10 minutes. Maximum dose 200 mcg/min. **Nitroglycerin is contraindicated in patients who have taken erectile dysfunction medication within the last 72 hours.**
7. Pain management per *Pain Control Protocol*.
8. **Heparin:** 60 units/kg IV (max dose 4,000 units).
9. **Heparin Infusion:** 12 units/ kg/ hr (max dose of 1000 units/hr.)
10. **Ranitidine (Zantac):** 150 mg PO, as needed.
11. **Metoprolol:** 5 mg IVP every 5 minutes. Max total dose 15mg.
12. **Ticagrelor (Brilinta):** 180 mg PO **OR** **Plavix** 300 mg PO

### If glycoprotein IIb/IIIa Inhibitors

1. Sending physician may initiated glycoprotein inhibitors. Glycoprotein inhibitor therapy may be continued based on sending physician orders.

## ACS/ STEMI (continued)

### If thrombolytic Therapy

1. Sending physician may initiate thrombolytic therapy. Thrombolytic therapy may be continued based on sending physician orders.
2. Inclusion criteria
  - a. Less than 75 years of age
  - b. Onset of symptoms  $\leq$  12 hours
  - c. LBBB
  - d. ST elevation  $>$  1mm in 2 consecutive leads
3. Exclusion criteria- relative
  - a. Diagnosed bleeding disorder
  - b. Uncontrolled hypertension
  - c. SBP  $>$  200 mmHg or DPB  $>$  120 mmHg
  - d. Pregnancy
  - e. CPR for greater than 10 minutes during this admission
  - f. Coumadin therapy with INR  $>$  2
  - g. Ischemic Stroke  $>$  6 months
  - h. Hemorrhagic Ophthalmic conditions
  - i. Recent access of non-compressible blood vessel
  - j. Trauma or major surgery  $>$  2 weeks ago,  $<$  2 months ago
4. Exclusion criteria- absolute
  - a. Allergy to thrombolytic agent
  - b. Internal bleeding within last 10 days
  - c. Ischemic stroke within last 6 months
  - d. Hemorrhagic stroke at any time
  - e. Intracranial or spinal trauma  $\leq$  2 months
  - f. Traumatic injury or surgery to non-compressible site  $<$  10 days
  - g. Suspected Aortic Dissection or Pericarditis

### Transport of STEMI Patients

1. Time is of the essence. Report information can be gained by the CCT team by contacting the receiving facility while enroute.
  - a. Medications that will be utilized during transport can be prepped prior to arrival at patient bedside.
  - b. A rapid assessment of the patient should occur at bedside.
    - i. Other than required forms for consent and transfer, no delay in transport should be allowed to wait for additional documentation.
  - c. Antiarrhythmics and pressors must be continued at all times.
  - d. Additional infusions such as anti-coagulants may be stopped until the patient is loaded into the ambulance and infusions restarted during transport.
  - e. Note infusion information from transferring facility prior to move.
  - f. Consider use of bolus medications in place of infusions.



## Induced Hypothermia

### Tier II & Tier III

Improved, neurologically intact survival (morbidity and mortality) from cardiac arrest has been associated with the use of post resuscitation induced hypothermia. Clinically induced hypothermia is an evidence based strategy that may improve patient outcome. Reducing the patient's body temperature to 33° Celsius has the potential to improve neurological outcome by reducing the oxygen free radical production.

### Assessment

For a patient to meet criteria for induced hypothermia, **ALL** of the following criteria must be met:

1. Cardiac arrest with return of spontaneous circulation within 60 minutes of arrest.
2. Adult patient age 18 or older.
3. Women with negative HCG.
4. SBP > 90 (with or without pressors).
5. No uncontrolled dysrhythmias
6. Mechanically ventilated.
7. Initial temperature > 30° Celsius.
8. Persistent comatose state secondary to post arrest (GCS <10).

For a patient to be excluded as a candidate for induced hypothermia, any of the following would negate the ability to treat with induced hypothermia

1. History of terminal illness or pre-existing comatose state.
2. Improving neurological status.
3. Primary intracranial event (CVA, trauma, seizure- status epileptic).

The following exclusion criteria require **Medical Control** approval to proceed with induced hypothermia.

1. Active bleeding or coagulopathies
2. Surgery within last 14 days
3. Documented sepsis
4. Non-cardiac causes of coma (drug overdose, CNS infections, encephalic causes)
5. Persistent hypoxia
6. Continued hemodynamic instability despite vasopressor and fluid resuscitation.
7. Pregnancy

## Induced Hypothermia (continued)

### Additional assessment and documentation

1. Pupillary response
  - a. Size and reactivity
2. Eye opening
3. Corneal reflex
4. Spontaneous respirations over ventilator
5. Oculocephalic response (doll's eye movement) but contraindicated if suspected C-Spine injury
6. Complete CGS assessment

### Treatment and Interventions

The target of induced hypothermia is to reduce the patients temperature to 32°-34° Celcius within 3 hours of cardiac arrest. When the temperature reaches 33° the cooling efforts should be moved to maintaining a temperature of 33° for 24 hours.

1. Initiate patient care based on the *Patient Care Overview*.
2. Patient is to remain intubated, chemically paralyzed if necessary.
3. Remove all clothing and cover with light sheet for privacy.
4. Ice packs should be applied to the groin and axilla.
5. Reduce temperature of patient care area to the lowest possible setting.
6. Avoid use of electrical humidifier on ventilator.
  - a. Place gastric tube based on *Gastric Tube Protocol*.
7. Temperature monitoring should occur via NG/OG tube, foley or other approved method, but initial temperatures can be assessed with rectal probe of portable thermometer.
8. Administer chilled **0.9% Normal Saline** 30mL/kg over 1 hour. Maximum dose of 2 liters.
  - a. This can be accomplished by placing disposable ice packs in exterior pouch of pressure bag.
  - b. Fluid administration is contraindicated in patients with pulmonary edema or those who are dialysis dependent.
9. Place continuous temperature monitoring probe via nasogastric or orogastric tube.
10. Sedate patient as needed based on *Patient Sedation Protocol*.
11. Elevate head of bed 30°.
12. Maintain MAP >65, target reading of 70-80.
13. Utilize *Vasopressor/Hypotension Protocol* if pressor support needed.
14. The patient is to remain intubated and chemically sedated.
15. Refer to Complex Patient protocol for exclusion criteria for Tier II providers.

## Cardiac Arrest

### Tier II & Tier III

While a variety of causes can lead to sudden cardiac arrest, the primary focus of the CCT team should be to immediately assist circulation and treat the cardiac abnormalities that present through a systematic approach. The primary factor for successful defibrillation and resuscitation is decreasing the time interval from onset of cardiac arrest to effective CPR, defibrillation and advanced life support. Additional focus should then look to reversible causes and working to correct those causes.

### Treatment and Interventions

Initiate patient care based on the *Patient Care Overview*.

Confirm unresponsiveness.

Initiate high quality CPR immediately upon recognition of arrest.

1. Pulse checks should be limited to 10 seconds or less.
2. Ventilations should be assisted at 12 breaths/min using oxygen at 15 L/min via BVM.
3. Defibrillation, if indicated should be initiated after 2 minutes of CPR or immediately after witnessing cardiac arrest. Defibrillate per manufacture's recommendations for biphasic defibrillation.
4. Proceed to treatment protocol based on specific cardiac rhythm encountered.
5. Secure Advanced Airway based on *Advanced Airway/RSI Protocol*.

#### Pearls

- **If the cardiac arrest is witnessed by EMS personnel, start CPR and defibrillate immediately after Fast Patches or Quick Combos are placed.**
- **Patients with implanted pacemakers or implanted defibrillators (AICDs) are treated the same way as any other patient; however do not place the electrodes, Quick Combo pads or Fast Patches over the top of the pacemaker or AICD site.**
- **Treat the patient – not the monitor. A rhythm present on the monitor screen should NOT be used to determine pulse. If the monitor shows a rhythm and the patient has no pulse, begin CPR (the patient is in PEA).**
- **Trauma patients in cardiac arrest should be evaluated for viability. When changing to CCT monitoring equipment, attach defibrillation cables prior to disconnecting the AED.**
- **Resuscitation and treatment decisions are based on the duration of the arrest, physical exam and the patient's medical history. Consider cease-effort orders if indicated.**
- **Consider underlying etiologies and treat according to appropriate protocols.**

## Resuscitation of Pulseless Rhythms

### Tier II & Tier III

The successful resuscitation of patients in cardiac arrest is dependent on a systematic approach to resuscitation. ACLS medications are an important factor in successful resuscitation of the pulseless patient when the initial rhythm is not ventricular fibrillation (V-fib) or in cases where defibrillation has been unsuccessful.

### Ventricular Fibrillation (V-Fib) or Pulseless Ventricular Tachycardia (V-Tach)

1. Initiate *Cardiac Arrest Protocol*.
2. **Epinephrine 1:10,000**: 1mg IV/IO or 2mg ETT if patient is pulseless and repeat every **3-5 minutes** as needed.
3. If pulseless V-Fib/V-Tach persists: Continue 2 minute cycles of CPR with pulse check and defibrillation as indicated.
4. **Amiodarone**: 300 mg IV/ IO for recurrent V-Fib/ V-Tach.
5. **Lidocaine**: 1.5mg/kg IV/IO. Repeat bolus: 1.5mg/kg IV in **3-5 minutes** to a total of 3mg/kg if patient remains in V-fib or V-Tach.
6. **Magnesium Sulfate**: 2 g IV over 2 minutes for Torsades de Pointes, digoxin toxicity, or known hypomagnesemic state.
7. If vagal-induced cardiac arrest, consider **Atropine** 1 mg IV/IO. Repeat every 3-5 minutes to a max of 0.04 mg/kg.
8. If conversion to perfusing rhythm initiate maintenance drip of effective anti-arrhythmic.
  - a. **Amiodarone**: 60 mg/hr for 6 hours. Reduce to 30 mg/hr for 18 hours.
  - b. **Lidocaine**: 2-4 mg/min.
    - i. If given IVP once set drip at 2 mg/min.
    - ii. If given IVP twice set drip at 3 mg/min.
    - iii. If given IVP three times, set drip at 3 mg/min.

### Pulseless Electrical Activity

1. Initiate *Cardiac Arrest Protocol*.
2. **Epinephrine 1:10,000**: 1mg IV/IO or 2mg ETT if patient is pulseless and repeat every **3-5 minutes** as needed.
3. If PEA persists: Continue 2 minute cycles of CPR with pulse check and defibrillation as indicated.
4. Search for reversible causes and treat based on applicable protocol.

## Resuscitation of Pulseless Rhythms (continued)

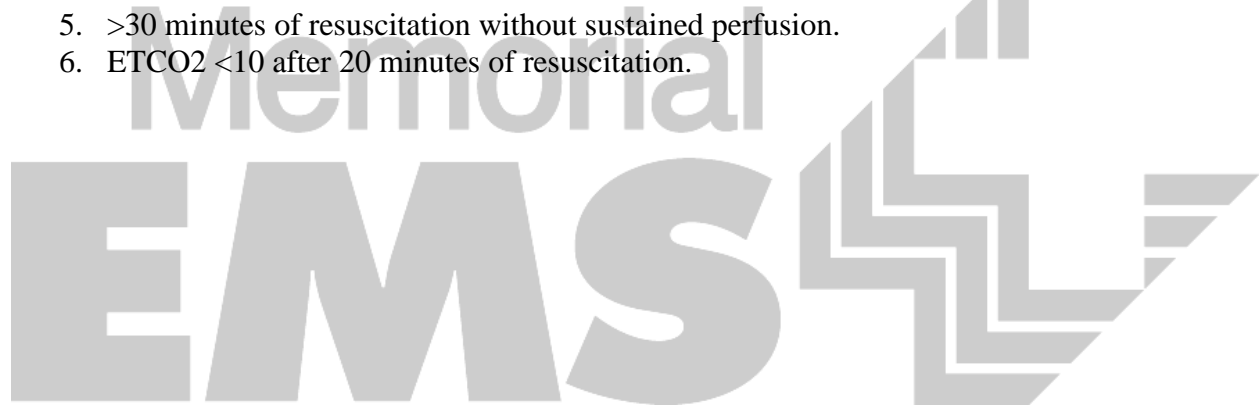
### Asystole

1. Initiate *Cardiac Arrest Protocol*.
2. **Epinephrine 1:10,000:** 1mg IV/IO or 2mg ETT every *3-5 minutes*.
3. Consider Termination of Resuscitation order.

### Termination of Resuscitation

Termination of Resuscitation must meet at least two of the following criteria

1. Asystole in 2 or more leads.
2. Prolonged interval between estimated time of arrest and initiation of resuscitation.
3. Patient of extreme age and/ or severity of comorbid disease states.
4. Absent brainstem reflexes.
5. >30 minutes of resuscitation without sustained perfusion.
6. ETCO<sub>2</sub> <10 after 20 minutes of resuscitation.



## Unstable Bradycardia

### Tier II & Tier III

Bradycardia is defined as a heart rate less than sixty beats per minute (< 60 bpm). Determining the stability of the patient with bradycardia is an important factor in patient care decisions. The assessment of the patient with bradycardia includes evaluation for signs and symptoms of hypoperfusion.

### Assessment

The patient is considered **stable** if the patient is asymptomatic (i.e. alert and oriented with warm, dry skin and a systolic BP > 100mmHg).

The patient is considered **unstable** if he/she presents with:

- An altered level of consciousness (ALOC).
- Diaphoresis.
- Dizziness.
- Chest pain or discomfort.
- Ventricular ectopy.
- Hypotension (systolic BP < 100mmHg).

### Treatment and Interventions

Initiate patient care based on the *Patient Care Overview*.

1. Evaluate and /or repeat 12-Lead EKG to confirm cardiac rhythm.
2. **IV Fluid Therapy:** 500mL 0.9% Normal Saline fluid bolus for systolic BP less than 100mmHg.
3. Initiate **Transcutaneous Pacing:** based on *Transcutaneous Pacing Protocol*
4. **Atropine:** 0.5mg IV if the patient's perfusion does not improve after the fluid bolus, if the patient is hemodynamically unstable or if the cardiac rhythm is an AV block (other than a 3<sup>rd</sup> degree block). May repeat 0.5mg IV every **5 minutes** up to a total of 0.4 mg/kg.
5. Initiate Vasopressor based on *Vasopressor/ Hypotensive Emergency Protocol*
  - a. **Dopamine:** 2-10 mcg/kg/min
  - b. **Levophed:** 1mcg/min. Titrate to desired affect with 2 mcg/min increases every 5 minutes. Max dose of 40 mcg/min.
  - c. **Epinephrine:** 2-10 mcg/min
6. If Beta or Calcium Channel Blocker overdose is suspected give **Glucagon** 3 mg IVP and infuse at 3 mg/hr.

## Unstable Bradycardia (continued)

### Tier III

7. Additional Vassopressor option(s) base on Vassopressor/ Hypotensive Emergency Protocol
  - a. **Isoproterenol:** 2-10 mcg/min

### Pearls

- **Treat the patient – not the monitor. Bradycardia does not necessarily mean that the patient is unstable or requires intervention.**
- **Treat underlying etiologies according to protocol.**
- **Atropine is NOT to be given if the patient's blood pressure is normal or elevated.**
- ***Bradycardia may be present due to increased intracranial pressure from a stroke or head injury.***
- **Factors to consider during the assessment of the patient who presents with bradycardia include: patient health & physical condition (e.g. an athlete), current medications (e.g. beta blockers), trauma or injury related to the event (e.g. a head trauma patient exhibiting signs of herniation or *Cushing's response*), and other medical history.**
- **Assess for underlying causes (e.g. hypoxia, hypovolemic shock, cardiogenic shock, or overdose).**
- **Fluid bolus should not delay Atropine administration or TCP if the patient is unstable.**
- **If the patient's presenting rhythm is a 3<sup>rd</sup> degree block, immediately prepare to pace. If the patient is symptomatic, pacing should be started without delay.**

## Narrow Complex Tachycardia

### Tier II & Tier III

Tachycardia is defined as a heart rate > 100 bpm. Once the heart rate reaches 150 bpm, the patient is at risk for hypoperfusion. A narrow QRS complex indicates that the rhythm may be originating in the atrium. Determining the stability of the patient with tachycardia is an important factor in patient care decisions. The assessment of the patient with tachycardia includes evaluation for signs and symptoms of hypoperfusion.

### Assessment

The patient is considered **stable** if the patient is alert and oriented with warm & dry skin and has a systolic BP > 100mmHg.

The patient is considered **unstable** if the patient has an altered level of consciousness, diaphoresis, dizziness, chest pain or discomfort, ventricular ectopy and/or is hypotensive.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Place defibrillation patches on patient in addition to monitoring capability.
3. Evaluate and /or repeat 12-Lead EKG to confirm cardiac rhythm.
  - a. *If Wolff Parkinson White syndrome immediately contact Medical Control for patient specific orders. Adenosine and Diltiazem are contraindicated and Adenosine cold make symptoms worse.*
4. Attempt vagal maneuvers.
5. **Adenosine (Adenocard):** 6mg IV {rapid IV push} if the patient is alert and oriented, has a systolic BP greater than 100mmHg, has a HR greater than 150bpm and is *obviously* not in atrial fib or atrial flutter. If no response after **2 minutes**, administer 12mg IV {rapid IV push}.
6. **Diltiazem:** 0.1 -0.25 mg/kg IV bolus over 2 minutes. May repeat at 0.35 mg/kg at 15 minute interval. Max dose of 25 mg.
  - a. Begin **Diltiazem infusion** at 5 mg/hr and increase by 5mg/hr every 15 minutes to control heart rate to max dose of 15 mg/hr
7. **Amiodarone:** 150 mg infusion over 10 minutes. 0.22 mL filter must be used in infusion.
  - a. **Amiodarone Maintenance infusion:** 1 mg/ min for 6 hours, then 0.5 mg/ min for 18 hours. Document times of rate changes and notify receiving RN.
8. **Metoprolol:** 5mg over 10 minutes. May repeat X2 to maximum dose of 15 mg.
  - a. Contraindicated for patients in CHF, heart blocks, valvular failure, cocaine or methamphetamine use, or HR < 50 or SBP < 90 mmHg.



## Narrow Complex Tachycardia (continued)

9. **Esmolol:** 500 mcg/kg bolus x1, start infusion at 50 mcg/kg/min and may increase by 50mcg/kg/min q 5 min to max of 300 mcg/kg/min
10. If rhythm is unresponsive to drug therapy or patient condition does not allow for the time needed to attempt drug therapy initiate **Synchronized Cardioversion** based on the *Synchronized Cardioversion Protocol*.

### A-Fib/ A-Flutter

1. **Diltiazem:** 0.25 mg/kg IV bolus over 2 minutes. May repeat at 0.35 mg/kg at 15 minute interval. Max dose of 25 mg.
  - a. Begin **Diltiazem infusion** at 5 mg/hr and increase by 5mg/hr every 15 minutes to control heart rate to max dose of 15 mg/hr
2. **Metoprolol:** 5mg over 10 minutes. May repeat X2 to maximum dose of 15 mg.
  - a. Contraindicated for patients in CHF, heart blocks, valvular failure, cocaine or methamphetamine use or HR < 50 or SBP < 90 mmHg.
3. **Amiodarone:** 150 mg infusion over 10 minutes. 0.22 mL filter must be used in infusion.
  - a. **Amiodarone Maintenance infusion:** 1 mg/ min for 6 hours, then 0.5 mg/ min for 18 hours. Document times of rate changes and notify receiving RN.
4. **Esmolol:** 500 mcg/kg bolus x1, start infusion at 50 mcg/kg/min and may increase by 50mcg/kg/min q 5 min to max of 200 mcg/kg/min
5. If rhythm is unresponsive to drug therapy or patient condition does not allow for the time needed to attempt drug therapy initiate **Synchronized Cardioversion** based on the *Synchronized Cardioversion Protocol*.

## Wide Complex Tachycardia

### Tier II & Tier III

Tachycardia is defined as a heart rate > 100 bpm. Once the heart rate reaches 150 bpm, the patient is at risk for shock. A wide-complex QRS indicates the rhythm may be of ventricular origin. Determining the stability of the patient with tachycardia is an important factor in patient care decisions. The assessment of the patient with tachycardia includes evaluation for signs and symptoms of hypoperfusion.

### Assessment

The patient is considered **stable** if the patient is alert & oriented with warm & dry skin and a systolic BP > 100mmHg.

The patient is considered **unstable** if the patient has an altered level of consciousness, diaphoresis, dizziness, chest pain or discomfort, ventricular ectopy and/or hypotension.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Evaluate and /or repeat 12-Lead EKG to confirm cardiac rhythm.
3. If stable, **Amiodarone**: 150 mg IV infusion over 10 minutes. 0.22 mL filter must be used in infusion.
4. If rhythm is unresponsive to drug therapy or patient condition does not allow for the time needed to attempt drug therapy initiate **Synchronized Cardioversion** based on the *Synchronized Cardioversion Protocol*.
5. If rhythm persists, **Lidocaine**: 1.5mg/kg IV/IO. May repeat every 5 minutes to max dose of 3 mg/kg.
6. If Torsades de Pointes or suspected hypomagnesemic state, give **Magnesium Sulfate** 2g IV over 5 minutes.

### Tier III

7. **Procainamide**: 2-4 mg/min

## Vasopressor/ Hypotensive Emergency

### Tier II & Tier III

Inadequate tissue perfusion, regardless of cause, is an immediate life threat and should be treated as such. While searching for possible reversible causes, the CCT team must also address the symptoms so to improve circulation and therefore organ and tissue perfusion.

### Assessment

Identification of the hypotensive patient is complicated by the often non-specific complaints, such as weakness/ malaise that the patient may present with. Focused history may help identify more information about the incident as well as a history of similar events.

- Signs and symptoms to be alert for include:
- SBP < 90 mmHg with
- Poor skin turgor
- Altered level of consciousness
- Delayed cap refill
- Weakness/ dizziness

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Treatment should include working to obtain a target MAP of 65.
3. If no signs of volume overload/ CHF (JVD, edema, pulmonary edema) give 500 mL fluid bolus of 0.9% Normal Saline.
4. Repeat boluses of 20 mL/kg as needed if no signs of fluid overload/ CHF are present
5. Vasoactive medications should be initiated via central access device, or through a peripheral IV (20ga or bigger) if unable to obtain central access, continuous close monitoring of IV site required.
6. **Dopamine:** 2-20 mcg/kg/min titrating to achieve target pressure.
7. **Levophed:** 2-10 mcg/min. Maintenance infusion of 2-40 mcg/min to obtain target pressure.
  - a. First choice for septic shock.
8. **Dobutamine:** 2-20 mcg/kg/min titrating to achieve target pressure.
  - a. Typically used with Levophed in patients with cardiogenic shock needing inotropic support after target pressure is achieved.
9. **Epinephrine:** 2-10 mcg/kg/min
  - a. First choice if anaphylactic shock.

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### Tier III

10. **Isoproterenol:** 2-10 mcg/min
11. Consider **Phenylephrine:** 100 to 180 mcg/min titrating to achieve target pressure
  - a. First choice for neurogenic (spinal) shock.
12. **Vasopressin:** 0.04 units/min titrating to achieve target pressure.
  - a. Second choice for septic shock refractory to Levophed.

## Transcutaneous Pacing

### Tier II & Tier III

Transcutaneous pacing (TCP) is used to deliver an electrical stimulus to the heart that acts as a substitute for the heart's conduction system and is intended to result in cardiac depolarization and myocardial contraction.

TCP should be utilized for patients with symptomatic bradycardia, namely Type II 2<sup>nd</sup> Degree AV Block and 3<sup>rd</sup> Degree AV Block (Complete Heart Block). Pacing may also be utilized early in the treatment of Asystole.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Evaluate and /or repeat 12-Lead EKG to confirm cardiac rhythm.
3. Apply the pacing pads to the patient using anterior-posterior placement. Place the negative electrode on the anterior chest between the sternum and left nipple (the upper edge of the pad should be below the nipple line). Place the positive electrode on the left posterior to the left of the spine beneath the scapula. Avoid placement over AICD or implanted pacemaker.
4. Activate the pacer mode and observe a marker on each QRS wave. If the marker is not present, adjust the EKG size.
5. Set the target rate at **70 bpm**.
6. Set the current at **minimum** to start.
7. Activate the pacer and observe pacer spikes.
8. Increase the current slowly until there is evidence of electrical and mechanical capture.
9. Palpate patient's pulse and check BP to verify conduction.
10. Provide pain control medication as needed based on the *Patient Sedation Protocol*.

## Synchronized Cardioversion

### Tier II & Tier III

Electrical cardioversion is the therapy of choice for hemodynamically unstable ventricular or supraventricular tachydysrhythmias with a pulse. Synchronized cardioversion may also be successful in treatment of the patient suffering from A-Fib with RVR and A-Flutter with RVR. Synchronization of the delivered energy reduces the potential for induction of V-Fib that can occur when electrical energy impinges on the relative refractory period of the cardiac cycle.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Evaluate and /or repeat 12-Lead EKG to confirm cardiac rhythm.
3. Provide pain control medications as needed based on *Patient Sedation Protocol*.
4. Apply Quick Combo pads or Fast Patches according to protocol and apply regular limb leads.
5. Push the synchronize sensor button on the defibrillator.
6. Confirm that the monitor is sensing “R” waves on the monitor screen (this is denoted by the darker mark on the screen with each complex).
7. Select the appropriate energy setting based on manufacturer’s biphasic recommendations.
8. Press the charge button.
9. Depress the discharge buttons simultaneously and wait for the shock to be delivered.
10. Note the rhythm and treat according to the appropriate protocol.
11. If the patient becomes pulseless at any time, turn off the synchronizer circuit and refer to the *Resuscitation of Pulseless Rhythms Protocol*.
12. If additional attempts at Synchronized Cardioversion are needed, ensure the cardiac monitor is in synchronizing mode.

## Ventricular Assist Devices

### Tier III

As healthcare advances increasingly develop greater technology, the ability of a patient to function, outside of the hospital, despite a significant heart failure diagnosis, for greater amounts of time is becoming a reality in our communities. Current technology has even moved to the point where patients whose cardiac function is dependent upon a ventricular assist device (VAD) can live almost indefinitely with the VAD and survive years without transplant.

A left ventricular assist device (LVAD) is a mechanical device with connections surgically implanted in the heart. The LVAD assists the failing heart in pumping blood to the rest of the body. Blood is taken from the compromised left ventricle and moved, via an implanted pump and tubing that pushed blood to the aorta. The pump is driven by drive line that is connected to the external power source and controller that the patient must wear at all times. The external power source is specific to the LVAD manufacturer but devices are now being utilized that allow for separate power source to be used rather than continuous reliance of the batteries.

LVAD use is divided into three categories. *Destination Therapy*, now becoming very common, is a situation where the LVAD is able to provide a level of functioning and quality of life that allows the patient to function outside of the hospital without plans for a heart transport. *Bridge to Transplant* refers to the situation in which the LVAD has been placed in a patient who is awaiting a heart transplant. The patient could be utilizing the LVAD for an extended time while he/she awaits transplant. *Bridge to Recovery* is a situation occasionally seen where an LVAD is being placed as a temporary method in order to address heart failure that is seen as temporary. In these rare situations the heart is able to recover after the resting period and resume pumping responsibilities at some later time.

### Assessment

Assessment of the patient who is reliant on an LVAD is very unique as compared to typical patients. The patient most likely will *not* have a pulse or blood pressure. In order to assess patient condition assess heart tones by use of a stethoscope. A constant or repeating humming sound indicated the device is functioning. Mental status, skin temperature/ color and machine alarms are the indicators that will provide continuous monitoring of patient status. A Mean Arterial Pressure can be assessed using a Doppler to assess a manual blood pressure.

Attention should always include ensuring that all connections to the external device are secure. The pump should not be covered by any bedding. The tubing should not be flexed.

## Ventricular Assist Devices (continued)

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Obtain orders specific to the patient from the transferring/receiving physician as to how a potential cardiac arrest should be handled. If patient still has some ventricular function on his/her own ventricular arrhythmias should be treated based on the appropriate *Cardiac Arrest Protocol*.
3. Obtain as much history from patient/ family and VAD coordinator regarding patient specifics as possible.
4. Perfusion can be assessed based on patient signs and symptoms as well as a dopplered MAP.
5. Pump components
  - a. Continuous flow pump
  - b. Console and monitor with battery
  - c. Flow probe
  - d. Back up console with additional battery
  - e. Power Conditioning Unit (CPU)- plug in unless moving patient
6. Adjusting pump flow
  - a. Adjust flow slowly and only under direct order of **Medical Control** or VAD Coordinator.
  - b. Adjust based on specific instructions from VAD Coordinator.
7. Normal operation settings.
  - a. Pump flow: 4-5 LPM
  - b. Pump speed: 3000-4000 RPM
  - c. MAP: 65 mmHg
8. Alarms
  - a. Pump not functioning alarms
  - b. Battery below minimum charge- switch to backup console/ monitor. Plug in to AC Power.
  - c. Pump not inserted- reconnect and restart.
  - d. Power test fail- switch to back up console or AC power.
  - e. Motor drive fail- switch to back up console
  - f. Motor fail- switch to back up console and motor
  - g. Motor disconnected- reconnect and start
  - h. System fault- switch to back up console

## Ventricular Assist Devices (continued)

- i. Pump functioning but with alarm
- j. Low battery- plug in to AC power
- k. Battery maintenance-ensure continuous power. Service battery as soon as possible.
- l. Battery charge failure- switch to secondary battery/ console/ monitor
- m. Motor over temp-switch to secondary battery/ console/monitor
- n. Flow above maximum- reduce pump speed as outlined in #6. Seek cause for alarm.
- o. Flow below minimum – increase pump speed as outlined in #6. Seek cause for alarm.
- p. Probe disconnected- reconnect probe
- q. Pump speed not reached- adjust pump speed as outlined in #6.
- r. Self-test fail- switch to back up probe.

### Pearls

Be sure to gather the patient 'go bag' with charging cables and any extra batteries. Look at all connections, controller and lights. Correct any issues found. Listen to the humming of the pump. If the green light is on, then the problem is a thrombosis. Feel the box. If it is hot, suspect thrombosis, lead dislodgement, or aortic dissection. Chest compressions are the last resort. While compressions could dislodge the pump, if the pump is not working compressions are the only way to keep the patient from dying. Aggressively resuscitate and include pressers to assist in resuscitation.

Patients with LVADs are very volume dependent and may need IVF boluses to improve status.

When transporting a patient with an LVAD always have the number of the LVAD Coordinator available. Always know where your closest hospital is during transport in case redirect is needed.



**E. Patient Care Procedures-Medical**



## Nausea and Vomiting/Acute Bowel Obstruction

### Tier II & Tier III

In addition to the problems that nausea and vomiting can create regarding patient comfort, such complaints can aggravate the management of more serious medical conditions. Additionally nausea and vomiting have the potential to create airway obstructions and/ or allow for the aspiration of vomitus.

### Assessment

Prior to every transport the patient should be questioned about their past history of motion sickness. The CCT team should anticipate motion sickness could occur with any patient but maintain a higher index of suspicion for a patient who has had previous issues. A negative patient response to this question, should allow time for the patient to also qualify their answer as many people have managed this difficulty with interventions such as always sitting in the front seat, or always being the driver.

Suction should be available at all times. The CCT team should also be alert to the need to move patient onto their side to facilitate vomiting and how that will impact and/or be limited by ongoing interventions and treatments.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Suction airway as needed to assist in airway maintenance.
3. Consider placement of an oral/ nasal gastric tube.
4. **Ondansetron:** 4 mg IV/IM/IN. May repeat in 10 minutes, as needed.
5. **Promethazine:** 12.5-25 mg slow IV/IM.
6. **Metoclopramide:** 10 mg IV.

## GI Bleeding

### Tier II & Tier III

Gastrointestinal bleeding can create multiple problems that can interfere with patient care. In addition to the concerns of airway maintenance the severity of the illness can lead to life-threatening problems because of the acuity and/or time the problems have been ongoing.

### Assessment

Assessment should focus on identifying the history of the present complaint, including time and volume of blood loss. Special attention should be given to airway assessment and management.

Suction should be available at all times. The CCT team should also be alert to the possibility of moving patient onto their side to facilitate vomiting.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Suction airway as needed to assist in airway maintenance.
3. Consider placement of an oral/ nasal gastric tube.
  - a. Contraindicated in a patient with history of esophageal varices.
4. If patient is hypotensive, treat based on *Vasopressor/ Hypotensive Protocol*.
5. If patient has vomiting, treat based on *Nausea and Vomiting/ ABO Protocol*.
6. **Protonix:** 80 mg IV infusion over 5 minutes.
  - a. **Protonix:** 8 mg/hour IV infusion.
7. **Octreotide:** 50 mg IVP for suspected Upper GI Bleed.
  - a. **Octreotide:** 50 mcg/hr IV infusion
8. If balloon tamponade has been utilized, advanced airway via endotracheal tube should be secured.
9. **Ranitidine:** 50 mg IV over 5 minutes.
10. **Famoditine:** 20 mg IV.
11. **Blood Products:** 1-2 units PRBCs or platelets based on *Blood Administration Protocol*.

## Hypoglycemia

### Tier II & Tier III

Hypoglycemia exists when the body does not have enough sugar carried in the blood supply. As a result tissue, organs and organ systems must function with less energy. This state continues until the systems cannot function as normal and then reduce the capabilities based on the loss of sugar while toxins are produced as a result of alternate metabolic processes. Of particular concern is the effect the decreased energy supply can do to damage the brain and vital organ systems.

### Assessment

The assessment of any patient with an altered level of consciousness should include assessment of blood glucose levels and patient history. Patients diagnosed with Type I diabetes are a significant population that is seeing a rapid increase in diagnosis. Many patients with Type II Diabetes are on Insulin or other drugs used to lower blood sugar.

Physical exam should also include looking for an insulin pump or other causes for event, or recurring event.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Establish blood glucose level on approved device.
3. Stop or remove Insulin pump.
4. If history of alcohol abuse or malnutrition **Thiamine:** 100 mg IVP.
5. For patient with blood glucose < 50 mg/dL and signs and symptoms consistent with hypoglycemia
  - a. **D10W:** 250mL/ 15 minutes, titrated to blood glucose  $\geq$  60 mg/dL
  - b. **Glucagon:** 1 mg IM/IN/IV
  - c. Repeat blood glucose level every 15 minutes
6. If blood glucose >50 mg/dL but still symptomatic
  - a. **D10W:** 125mL/ 15 minutes, titrated until symptoms resolve.
  - b. **Glucagon:** 0.5 mg IM/IN/IV
  - c. Repeat blood glucose level every 15 minutes

## Hyperglycemia/ DKA

### Tier II & Tier III

Hyperglycemia, and ultimately Diabetic Ketoacidosis, should be recognized as extreme detriments to metabolic perfusion that results in an acidotic state affecting multiple organ systems. The impact on affected organ systems can create hypovolemia, electrolyte imbalances, renal overload and metabolic acidosis.

### Assessment

Assessment should focus on the signs and symptoms over a longer time frame than current evaluation. DKA typically requires multiple days of symptoms to manifest with symptoms starting very minimally. Consult family for several days of history.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Establish blood glucose level before leaving facility, on approved device.
3. Subsequent repeats every 45 minutes throughout transport.
4. Stop or remove Insulin pump.
5. If blood glucose <400 mg/dL
  - a. **0.9% Normal Saline:** IV Fluids (including fluids given at transferring facility)
    - i. 1000 mL/hour for first hour
    - ii. 500 mL/hour for 4 additional hours
6. If blood glucose  $\geq$ 400 mg/dL
  - a. **0.9% Normal Saline:** IV Fluids (including fluids given at transferring facility)
    - i. 2000 mL/hour for first hour (may run to gravity if no concern of overload)
    - ii. 500 mL/hour for 4 additional hours
7. Change to **D5NS** 250 mL/hr when blood sugar reaches 250 mg/dL or less.
8. **Insulin Infusion:** 100 units/100 mL 0.9% Normal Saline at 0.1 units/kg/hour
  - a. If transferring a patient with Insulin Infusion and orders of unit/hr, ensure dose does not exceed 0.1 units/kg/hour.

### Pearls

- **Treatment of DKA requires insulin to close Anion gap. Supplemental D5NS may be given while infusing insulin. Insulin infusion should only be stopped if patient becomes hyperglycemic refractory to supplemental dextrose.**
- **Do NOT given Insulin Bolus to a patient who is already receiving an insulin infusion.**
- **Always have D10W available to administer to a patient who is receiving Insulin should patient become hypoglycemic.**

## Seizures

### Tier II & Tier III

The assessment of any patient displaying seizure activity should include assessment of blood glucose levels, patient history, and a detailed physical exam to identify possible causes of the seizure. Seizure activity can range from full body tonic-clonic activity to subtle activity such as isolated, localized twitching or eye movement. Regardless of the level of activity, searching for a cause and treating the observed symptoms are critical to limiting neurological damage from the seizure.

### Assessment

Assessment should focus on the signs and symptoms of the event with a keen interest in searching for causes of the current event. While non-compliance with medication can be an easy to identify cause, it may not be the only cause. Consult family/ witnesses for events leading up to the seizure and history of recent activities.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Work to ensure a safe surrounding for the patient, even after initial seizure had been stopped.
3. Establish blood glucose level on approved device.
4. If blood glucose is below 60 mg/dL treat based on *Hypoglycemia Protocol*.
5. If blood glucose is above 400 mg/dL treat based on *Hyperglycemia/ DKA Protocol*.
6. If patient condition requires sedation for airway management, short duration neuromuscular blockers should be used. Treat based on *Advanced Airway/ RSI Protocol*.
7. **Thiamine:** 100mg IV over 2 minutes if chronic alcohol abuse is suspected.
8. If patient is actively seizing
  - a. **Lorazepam:** 2mg IV; Can repeat every 2-5 minutes up to 10mg.
  - b. **Midazolam:** 2 mg IV or 5 mg IM or 10 mg IN. Can repeat every 2-5 minutes up to 15 mg.
  - c. **Diazepam:** 5-10 IV. Can repeat every 10-15 minutes up to 30 mg.
9. If more than one dose of Benzos needed
  - a. **Fosphenytoin:** 15-20 mg/kg in 100 mL of 0.9% Normal Saline over 30 minutes. Infusion rate should not exceed 150 mg/min. Watch for cardiac dysrhythmias.
  - b. **Phenobarbital:** 10-20mg/kg every 20 minutes (not to exceed 60 mg/min) until seizure activity is stopped. Max dose of 30 mg/kg.

**Seizures (continued)**

**Tier III**

10. If Advanced Airway was required and seizures continue, consider **Propofol** infusion at 10-20 mcg/kg/min slow infusion. Maintenance infusion of 5-55 mcg/kg/min. Propofol has been shown to effectively suppress seizure activity.



## Altered Mental Status

### Tier II & Tier III

The patient suffering from an altered mental status/ altered level of consciousness (ALOC) can present with a condition ranging from very obvious distress to very subtle symptoms. Careful assessment and interview of the patient and any available family members can be key to recognizing the more subtle differences in mental status. Regardless of the severity of the AMS, attention should focus on aggressively treating the condition and preventing possible long term effects of the situation.

### Assessment

Assessment of the patient suffering from an altered mental status should focus on identifying the cause of the AMS while treating the resulting symptoms. Additionally, the patient care situation should be continuously monitored to ensure patient and provider safety. Include family members and/or witness to the patient condition to provide details as to the depth of the AMS as well as identify a time when the change occurred, a Last Known Well.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Establish blood glucose level on approved device.
3. If blood glucose is below 60 mg/dL treat based on *Hypoglycemia Protocol*.
4. If blood glucose is above 400 mg/dL treat based on *Hyperglycemia/ DKA Protocol*.
5. Be attentive to patient's ability to maintain airway. Initiate Advance Airway based on *Advanced Airway/ RSI Protocol* as needed.
6. If CVA/ TIA is suspected, treat based on *Stroke Protocol*.
7. **Thiamine:** 100 mg IV or IM if chronic alcohol abuse is suspected.
8. **Narcan:** 2 mg IM/IN if drug abuse is suspected and patient has signs of narcotic intoxication.

### Pearls

- **Do NOT use Flumazenil for patient's with Benzo overdose or who chronically take Benzos. Flumazenil may cause intractable seizures.**
- **Do NOT use Flumazenil for patient's on Selective Serotonin Reuptake Inhibitors (SSRI). Flumazenil may cause intractable seizures.**



## Stroke

### Tier II & Tier III

A Cerebral Vascular Accident (Stroke) is patient condition that is gaining recognition as an emergency condition equivalent to the AMI. As medical treatment continues to advance, patients suffering from a stroke now have multiple treatment modalities that can help to stop the damage and end the causing medical condition. While aggressive physical therapy continues to be the method of addressing the damage after it has occurred, current focus places the impetus on stopping the cause of the damage rather than working to reverse damage.

### Assessment

Patient assessment should focus on rapidly identifying symptoms and ruling out possible other causes of the those symptoms for the patient with symptoms consistent for a stroke. In the care of a stroke patient, time is brain and urgency should be given to identifying the cause of the patient's condition and time when the patient was last symptom free ( Last Known Well).

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Identify possible causes of condition and treat based on *Altered Mental Status Protocol*.
3. Be attentive to patient's ability to maintain airway. Initiate Advance Airway based on *Advanced Airway/ RSI Protocol* as needed
4. Complete Fast Exam
  - a. **Face:** When the patient smiles, with teeth, is any asymmetry noted?
  - b. **Arm:** Is the patient able to hold both arms straight out in front and hold that position for 10 seconds with eyes closed? Is there a drift of one arm?
  - c. **Speech:** Is the patient able to recite 'The sky is blue in Cincinnati'? If family present, compare speech to normal speaking ability.
  - d. **Time:** When was the last know well? If a specific time has not been established, rather a 'minutes/hours ago' work to identify the specific time.
5. Attention should be focused on treatment of the patient in the time frame of less than 6 hours to receive definitive care.
6. If CAT Scan has been completed and results verified by radiology treat based upon the diagnosis.
7. If CAT Scan has not been completed, immediately initiate transport to appropriate facility.
8. If last known well is within the 4.5-6 hour window, transport needs to be made to a Comprehensive Stroke Center or Primary Stroke Center with Endovascular Capabilities.
9. If transfer has not been coordinated to facility best able to treat the patients condition, immediately consult with transferring physician and patient to coordinate appropriate receiving facility. If patient is not being transferred to appropriate facility, include in Patient Care Report witnesses to the patient's informed decision to not seek treatment at most appropriate facility.

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## Stroke (continued)

### If Transischemia Accident

1. If the transferring diagnosis is transischemic accident, treatment will focus on monitoring and supportive care.

### If Ischemic Stroke

1. Transport patient in position of comfort with head elevated 30° and with head in inline/neutral position.
2. Maintain SBP based on transferring and receiving facility orders.
3. Minimize IV sticks to patient as much as possible.
4. Complete neurological exams and BP checks every 15 minutes at minimum.
5. Thrombolytic Therapy:
  - a. **Alteplase:** 0.9 mg/kg (maximum dose 100 mg)
    - i. 10% of dose given as IV bolus
    - ii. Remaining 90% given as IV infusion over 60 minutes.
6. If hypertensive, SBP > 180 or DBP > 110 during or after Alteplase
  - a. **Labetalol:** 20 mg slow IVP. Can repeat every 10 minutes with additional doses at 40 mg and then 80 mg for all repeated doses. Maximum total administration of 300 mg.
    - i. *Use with caution if heart rate < 60.*
  - b. **Nicardipine:** 5 mg/hr IV infusion. Increase infusion by 2.5 mg/hr every 5-15 minutes until target SBP is achieved. Maximum dose 15 mg/hr.

### If Hemorrhagic Stroke

1. Transport patient in position of comfort with head elevated 30° and with head in inline/neutral position.
2. Maintain SBP between 160-180 mmHg if no ICP Monitor.
3. **Nicardipine:** 5 mg/hr IV infusion. Increase infusion 2.5 mg/hr every 5-15 minutes until target SBP is achieved. Maximum dose 15 mg/hr.
4. **Labetalol:** 10-20 mg slow IVP. Can repeat every 10 minutes with additional doses at 40 mg and then 80 mg for all repeated doses. Maximum total administration of 300 mg.
5. If ICP in place maintain CPP at 70-100 mmHg.
6. If suspected cerebral herniation immediately contact **Medical Control**.
7. If patient is intubated refer to transfer order or maintain ET<sub>CO</sub>2 at 30-35 mmHg.
8. If Mannitol infusion completed prior to request, Tier II can assume care.
9. Notify receiving facility of acute change in patient condition as soon as possible to confirm appropriate bed assignment.

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#### Tier III

10. **Mannitol:** 0.5-1.0 g/kg IV over 5-10 minutes with **Medical Control**. Filter must be used.

## Stroke (continued)

### If Subarachnoid Hemorrhage

1. Transport patient in position of comfort with head elevated 30° and with head in inline/neutral position.
2. Maintain SBP <140 mmHg if no ICP Monitor.
3. If SBP reduction is needed
  - a. **Nicardipine:** 5 mg/hr IV infusion. Increase infusion 2.5 mg/hr every 5-15 minutes until target SBP is achieved. Maximum dose 15 mg/hr. Once target SBP is achieved, reduce dose by 3 mg/hr.
  - b. **Labetalol:** 10-20 mg slow IVP. Can repeat every 10 minutes with additional doses at 40 mg and then 80 mg for all repeated doses. Maximum total administration of 300 mg.
4. If ICP in place maintain CPP at 70-100 mmHg.
5. If patient is intubated refer to transfer order or maintain ETCO<sub>2</sub> at 30-35 mmHg.
6. If hypotensive, aggressively treat based on *Hypotension/ Vasopressor Protocol* to a SBP > 90.
7. Provide pain medication as needed based on *Pain Control Protocol*.
8. If Mannitol infusion completed prior to request, Tier II can assume care.
9. Notify receiving facility of acute change in patient condition as soon as possible to confirm appropriate bed assignment.

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### Tier III

10. **Mannitol:** 0.5-1.0 g/kg IV over 5-10 minutes with **Medical Control**. Filter must be used.

## Toxin Exposure

### Tier II & Tier III

An innumerable quantity of toxins exist. The CCT team will encounter a specific few most frequently. For those toxic exposures for which a specific protocol does not exist, good patient assessment and treatment based upon corresponding guideline as well as coordination between Medical Control and hospital physicians will allow for the best plan of action for patient care.

### Assessment

Assessment of a patient suffering from any type of toxin exposure must first focus on the safety of the CCT team. The second priority must then focus on ensuring patient safety by ensuring that the exposure is over and will not reoccur. Acute assessment skills may be needed to determine the likely cause of the exposure as well as any factors that are likely to increase morbidity and mortality due to patient risk factors.

### Treatment and Interventions

1. Ensure Scene Safety for the CCT team prior to establishing any patient contact.
2. Obtain as much information about the patient exposure prior to arrival on scene.
3. Contact **Medical Control** if any concerns about the safety of the CCT team responding to the patient location and transporting patient to another facility.
4. Initiate patient care based on the *Patient Care Overview*.
5. Work to identify the cause of the exposure and treat based on the appropriate protocol.
6. If unable to identify source, but safety can be ensured, treat based upon symptomatology with the appropriate corresponding protocol.

#### If exposure to Airway/ Inhalation Injury

1. Initiate Advance Airway based on *Advanced Airway/ RSI Protocol*.
2. If unable to obtain Advanced Airway with 2 attempts **and** airway compromise (particularly upper airway) is present, secure emergent airway based on the *QuickTrach / Emergency Cricotomy Protocol*.

#### If exposure to Benzos

1. **If overdose is the result of anesthesia, Flumazenil:** 0.3 mg over 30 minutes. May repeat to a maximum of 1.0 mg.
2. Avoid Flumazenil on all other Benzo and SSRI overdoses due to potential for seizures.
3. Use Narcan with extreme caution in opioid dependent patients due to the severe withdrawal it can cause, resulting in patient management issues.

## Toxin Exposure (continued)

### If exposure to Beta Blockers

1. Closely monitor for changes in patient condition.
2. 500 mL fluid bolus as needed for pressure support. Repeat as needed, up to 2 L.
3. **Glucagon:** 3-10 mg IV.

### If exposure to Caustics

1. Avoid attempts to neutralize the substance due to the additional damage that can occur.
2. If exposure to the airway, initiate Advance Airway based on *Advanced Airway/ RSI Protocol* as needed.
3. If unable to obtain Advanced Airway with 2 attempts **and** airway compromise (particularly upper airway) is present, secure emergent airway based on the *QuickTrach / Emergency Cricotomy Protocol*.
  - a. If exposure is so extreme that airway cannot be established, consult with transferring and receiving facilities as well as **Medical Control** regarding the benefits of transport and consider Termination of Resuscitation order prior to initiating transport.

### If exposure to Calcium Channel Blocker/ Magnesium Sulfate

1. **Calcium Gluconate 10%:** 1,000 mg over 5-10 minutes. May repeat once in 5-10 minutes.
  - a. Calcium is contraindicated if possible Digoxin toxicity.
2. **Glucagon:** 3-10 mg IV.

### If exposure to Carbon Monoxide

1. Ensure that patient has been removed from the environment that caused the exposure. Document the time since the patient was moved to an environment with safe CO levels, even if this was an initial move to an outdoor location.
2. Document the estimated length of the exposure. If available, also document the CO reading that was obtained by fire department or other response agency.
3. Do not rely on SpO<sub>2</sub> reading.
4. Administer 100% oxygen by NRB.
5. Initiate Advance Airway based on *Advanced Airway/ RSI Protocol*.
  - a. If intubated work to maintain ETCO<sub>2</sub> between 35-40 mmHg.
6. Continue **Cyanokit**, if started by transferring facility, based on package insert directions if hydrogen cyanide exposure is considered.
7. Consult with **Medical Control** if the patient destination is the most appropriate or if recommendation to a facility with hyperbaric oxygen therapy would be more prudent.

## Toxin Exposure (continued)

### If Cocaine/ Methamphetamine Overdose

1. Be attentive to patient's ability to maintain airway. Initiate Advance Airway based on *Advanced Airway/ RSI Protocol* as needed.
2. Avoid Beta Blocker use in supportive protocols.
3. **Lorazepam:** 1 mg IV/ IM.
4. **Haloperidol:** 5 mg IV/ IM.
5. **Versed:** 2 mg IV, or 5 mg IM or 10 mg IN. May repeat in 10 minutes to a maximum of 2 doses.

### If digoxin overdose

1. **Digibind:** Number of vials to be given= dig level (mg/dL) \* wt/ 100
  - a. Digibind must be initiate by transferring facility. CCT team will not carry.
2. Be alert for hyperkalemia. Calcium Gluconate is contraindicated for hyperkalemia in patients who are dig-toxic.

### If exposure to eyes

1. Irrigated with a minimum of 1,000 mL 0.9% Normal Saline or Sterile Irrigation solution via Morgan Lens.
2. If bandaging of effected eye is needed, both eyes should be secured.
3. **Tetracaine:** 1-2 drops per eye. May repeat every 10-15 minutes as needed, if pain medication needed for eyes

### If Narcotic overdose

1. Be attentive to patient's ability to maintain airway. Initiate Advance Airway based on *Advanced Airway/ RSI Protocol* as needed.
2. **Naloxone:** 2 mg IV/ IN. May repeat every 3-4 minutes.
3. **Narcan Infusion:** 1.5 mg/ hr.

### If exposure to Organophosphates/ Cholinergic Poisoning

1. Ensure that patient has been removed from the environment that caused the exposure. This includes ensuring that all contaminated clothing has been removed. Do not transport patient clothing. Document the time since the patient was removed from the exposure, even if this was an initial move to an outdoor location.
2. Document the estimated length of the exposure.
3. **Atropine:** 1-2mg IV. Repeat every 5-10 minutes until SLUDGE symptoms resolve.

## Toxin Exposure (continued)

### If overdose of Tricyclic Antidepressants

Closely monitor patient's cardiac rhythm. Widening QT Interval or QRS complex are ominous signs of impending cardiac dysrhythmias and seizures.

1. **Sodium Bicarbonate:** 50 mEq IV May repeat X2 every 5 minutes for widened QRS or dysrhythmias.
2. **0.9% Normal Saline:** 500-1,000 mL bolus.
3. If seizures, treat based on *Seizure Protocol*.
4. If Hypotension, contact **Medical Control** for orders.
5. If non-cardiac arrest arrhythmias contact **Medical Control** for orders.
  - a. If cardiac arrest, **Magnesium Sulfate** 1-2 g over 1-2 minutes. May repeat in 5-10 minutes without contacting Medical Control.
6. Refer to Complex Patients Protocol for exclusion criteria for Tier II providers.



## Sepsis

### Tier II & Tier III

Sepsis is a life-threatening illness that affects a large number of hospital patients. Mortality and morbidity from sepsis continue to be among the largest to affect patient outcomes. The complex way in which the septic infection effects the body creates multiple other potential problems for the patient. Exposure to microorganisms of any origin can lead to a Systemic Infection. Most Sepsis is commonly caused by gram negative organisms. Gram positive sepsis causes have been noted to be increasing. Patients who are receiving ongoing care, and often those who require the use of foley catheters, are among the most likely patients to suffer from sepsis.

### Assessment

While fever is the most common indicator that a patient is suffering from an infection, fever in the septic patient may present late and in some cases not at all. Additionally, some septic patients suffer from hypothermic body temperatures. An in-depth history of recent events will be helpful in identifying possible septic patients.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. If febrile and it has not already been given, **Acetaminophen** 10-15 mg/kg PO/PR. Max 1 mg.
3. Antimicrobial treatment should be started by transferring facility prior to CCT arrival. If not, CCT should work with transferring and receiving physicians to establish orders and initiate treatment prior to transport for continuation of treatment during transport.
4. **0.9% Normal Saline:** 30mL/kg IV Bolus. Use pressure bags to assist with infusion. Repeat as needed to maintain MAP > 65 mmHg.
  - a. The most important interventions in treating Septic patients is early broad spectrum antibiotics and adequate volume resuscitation
  - b. Be alert to not fluid overload patient. Reduce infusion rate and seek pressor support as needed.
5. If advanced airway is needed, secure based on *Advanced Airway/ RSI Protocol*.
6. If MAP<65 mmHg after fluid bolus, initiate *Hypotension/ Vassopressor Protocol*.
  - a. If Levophed and Epinephrine and are unsuccessful

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### Tier III

- b. The next drug of choice would be Vasopressin.



## Potassium Imbalance

### Tier II & Tier III

As one of the major ions of the body, Potassium is essential to the Renal System, cardiac and skeletal muscles, nerve connectivity, and maintaining of the cellular membranes. A slight change in Potassium can lead to multiple organ system difficulty if not recognized and treated.

### Assessment

A Potassium imbalance does not develop quickly. The signs and symptoms are often so subtle that the patient may have been in a state of Potassium imbalance for several days before the symptoms became debilitating enough to notice and seek treatment. An in-depth history of the past several days can help to key in on the likely causes of the patient's illness.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Secure advanced airway as needed based on *Advanced Airway/ RSI Protocol*.
3. If Potassium 3.0-6.0 mEq/L provide supportive treatment.

#### For Hypokalemia

1. **Potassium Chloride:**
  - a. IV infusion up to a max of 10 mEq/ hr per peripheral IV. Maximum concentration of 10 mEq/100 mL.
2. Consider **Magnesium Sulfate** 2 GM over 1 hour if hypomagnesemic. Consult **Medical Control** for order.

#### For Hyperkalemia

1. If cardiac rhythm changes are noted or if Potassium > 7.0 mEq/L
  - a. **Calcium Gluconate:** 1 GM slow IVP over 5 minutes. May repeat every 10 minutes. May be given via peripheral IV.
    - i. If patient currently takes Digoxin, infuse Calcium Gluconate in 100 mL 0.9% Normal Saline over 30 minutes.
  - b. **Calcium Chloride 10%:** 1GM over 2 minutes. May repeat every 10 minutes.
    - i. If patient currently takes Digoxin, infuse Calcium Chloride in 100 mL 0.9% Normal Saline over 30 minutes.
    - ii. **Calcium Chloride can only be given via peripheral IV in arrest situation, otherwise central line administration must be utilized.**
2. **Sodium Bicarbonate:** 50 mEq IV.
3. As signs and symptoms persist, steps # 4-5 can be repeated every 60 minutes.
4. **D10W:** 25 g IVP followed with Regular Insulin 10 units.
  - a. Check blood sugar on approved device every 30 minutes.
5. **Albuterol:** 10 mg in 3 mL NS, nebulized.

## Anaphylaxis

### Tier II & Tier III

Anaphylaxis, or anaphylactic shock, is a life threatening emergency that the CCT team must always be prepared to recognize and treat. While the CCT team will most likely not be involved in the first minutes of the treatment of an environmentally caused anaphylactic reaction, they must always be alert for changes in the patient condition as a result of medications being given during transport that could lead to anaphylaxis.

### Assessment

Identifying the patient suffering from anaphylaxis leads to patient care that is simultaneously treating the anaphylaxis while working to identify and stop the cause of the reaction. Causes typically fall into three categories: medication (including blood products and latex), envenomation, and food related.

The CCT team should maintain a high index of suspicion regarding anaphylaxis for any patient complaining of

- Urticaria
- Flushing
- Itching
- Facial Edema
- Sudden temperature increase
- Laryngedema
- Hypotension

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Administer 100% Oxygen via NRB. Secure advanced airway as needed based on *Advanced Airway/RSI Protocol*.
3. **0.9% Normal Saline:** 250 mL IV infusion. Repeat as necessary
4. **Albuterol:** 2.5 mg in 3 mL nebulizer. Utilize inline nebulizer for intubated patients. May repeat as needed.
5. **Diphenhydramine:** 50 mg IV over 2 minutes. May repeat once.
6. **Epinephrine 1:1,000:** 0.3-0.5 mg IM every 15 minutes until symptoms decrease.
7. Treat hypotension based on *Vasopressor/Hypotension Protocol*. Epinephrine infusion should be first drug of choice.
8. **Methylprednisolone Sodium Succinate:** 125 mg IV.
9. **Ranitidine:** 50 mg IV diluted in 50 mL 0.9% Normal Saline over 5 minutes.
10. Refer to Complex Patient Protocol for exclusion criteria for Tier II providers.

## Temperature Related Illnesses

### Tier II & Tier III

Temperature related illnesses can occur at any time of year. A slight change in body temperature can have great effects on the body's ability to maintain homeostasis and normal body functions. Prolonged exposure, and exposure for those who suffer from extremes of age or additional medical conditions, can dramatically decrease the body's ability to recover from the exposure.

### Assessment

Patient assessment should focus on identifying the reason/ cause of the exposure and ensuring the exposure is not continuing. Additionally, the CCT team needs to be cognizant of the environment the patient has been placed in since the exposure. Attempts to rapidly correct temperature related illnesses by moving the patient to an environment with the opposite extreme ambient temperature should be avoided and a more gradual approach taken.

### Treatment and Interventions

**For Hyperthermia and Heatstroke** (May apply to patients with Excited Delirium. See also *Patient Sedation Protocol*.)

1. Initiate patient care based on the *Patient Care Overview*.
2. Assess core temperature. Initiate continuous temperature monitoring.
3. Cover patient with light sheet to prevent shivering.
4. **0.9% Normal Saline:** 250 mL fluid bolus. Repeat as necessary.
5. Actively cool patient
  - a. Ensure removal to cooler environment.
  - b. Remove patient clothing.
  - c. Apply cold packs to groin, axilla, and back of neck.
  - d. Initiate evaporative cooling by applying cool water to patient's body in small amounts and increase air movement to maximize convection and conduction. Be cautious to not create fluid puddling under the patient.
6. If altered level of consciousness treat based on *Altered Mental Status Protocol*.

## Temperature Related Illnesses (continued)

### For Hypothermia

1. Initiate patient care based on the *Patient Care Overview*.
2. Assess core temperature. Initiate continuous temperature monitoring.
3. Handle patient very carefully and gently.
4. If patient is in cardiac arrest, treat based on appropriate *Cardiac Arrest Protocol*. The patient resuscitation cannot be stopped unless the patient's core temperature has returned to 35° C.
5. Actively rewarm the patient
  - a. Move patient to warm environment and ensure second exposure cannot occur.
  - b. If any clothing is wet or frozen, remove and move away from the patient. Remove any constrictive jewelry.
  - c. Cover all but face of patient unless interventions are being completed. Be sure to wrap head with blanket.
  - d. **0.9% Normal Saline:** 250 mL fluid bolus, then reduced to 100 mL/ hr. IV fluids should be warmed to 42° C.
  - e. Apply warm packs to the groin, axilla and back of neck.
  - f. Keep patient care area as warm as possible.
6. If altered level of consciousness treat based on *Altered Mental Status Protocol*.

### For Frostbite

1. Initiate patient care based on the *Patient Care Overview*.
2. Assess core temperature. Initiate continuous temperature monitoring. If core temperature < 35° C treat for hypothermia.
3. Handle patient very gently and carefully.
4. Work to ensure warm environment for the patient, ensure that no blankets are creating pressure on the affected area. Ensure that second exposure to cold cannot occur.
5. **0.9% Normal Saline:** 250 mL fluid bolus, then reduced to 100 mL / hr. IV fluids should be warmed to 42° C.
6. Care for affected area should include
  - a. Protect from any unnecessary pressure, friction, trauma. Do not rub. Do not allow blisters to be broken.
  - b. Remove patient clothing. Remove any restrictive jewelry from affected extremity.
  - c. Do not allow patient to use affected area or extremity.
  - d. Loosely wrap affected area with sterile bandages. Ensure no skin remains in contact with another area of skin.
7. If altered level of consciousness treat based on *Altered Mental Status Protocol*.
8. Treat for pain based on *Pain Control Protocol*.

## Pulmonary Embolism

### Tier II & Tier III

A pulmonary embolism can begin anywhere in the body, but most commonly occurs when a thrombi develops deep within the venous system. The pulmonary embolism is most frequently seen in patients who recently experienced an extended period of inactivity (such a transcontinental flight), or in combination with the decreased activity of a patient recovering from a recent surgery or medical procedure. The thrombi travels through the circulatory system until becoming lodged in the lung and preventing appropriate respiration from occurring.

### Assessment

Assessment should focus on obtaining a good patient history, including activities over the past several days. In-depth assessment of the potential respiratory or cardiac patient can also help to pinpoint symptoms more inline with the pulmonary embolism.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Administer 100% Oxygen via NRB. Secure advanced airway as needed based on *Advanced Airway/RSI Protocol*.
3. Provide pain management based on *Pain Control Protocol*.
4. Anticoagulation therapy can be continued based on transfer orders.
5. Thrombolytic therapy can be continued based on transfer orders.
  - a. **Heparin:** Initial bolus 80 units/ kg IV. Maximum of 7500 units. Infusion 18 units/ kg/ hour. Maximum of 1800 units/ hr.
  - b. **Alteplase:** 100 mg IVPB over 2 hours.

## Aortic Aneurysm/ Aortic Dissection

### Tier II & Tier III

An aortic aneurysm and/or dissection is a situation where the CCT team is in a race against the clock on a lethal condition. Survival rates from both are greatly dependent on the timely recognition, appropriate stabilization and seamless communication with hospital surgical team to ensure the receiving facility is ready to receive the patient upon arrival and immediately begin the repair.

### Assessment

Assessment of the patient with an aortic aneurysm or aortic dissection must focus on the known history as well as sequence of events leading up to the patient's call for assistance. Rapid physical exam may be of some use in identifying the potential aortic disruption by assessing the quality of circulation in both upper and lower extremities. A very late, ominous finding is Grey Turner sign identifying retroperitoneal hemorrhage.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Ensure copies of all radiography studies have been forwarded to receiving facility. If at all possible take a copy with patient.
  - a. It is of greater time benefit that all radiographic studies be completed at transferring facility and electronically forwarded to receiving facility so that receiving facility can be fully prepared to intervene upon patient arrival.
3. Administer 100% Oxygen via NRB. Secure advanced airway as needed based on *Advanced Airway/ RSI Protocol*.
4. Initiate 2 large bore IV sites, limit fluid resuscitation of **0.9% Normal Saline** to TKO unless patient is hypotensive.
5. Provide pain medication based on *Pain Control Protocol* so long as SBP allows.
6. Seek to maintain SBP of 80-100. A permissive hypotensive strategy should be utilized to improve survival of these complex illness patients. MAP goal should be lowered to 60.
7. If patient is hypertensive as compared to goal SBP and has HR > 60
  - a. **Esmolol**: 500 mcg/kg bolus x1, start infusion at 50 mcg/kg/min and may increase by 50mcg/kg/min q 5 min to max of 300 mcg/kg/min
  - b. **Labetalol**: 10-40 mg IV over 2 minutes. Can repeat every 10 minutes with additional doses at 40 mg and then 80 mg until
    - i. SBP  $\geq$  100 mmHg.
    - ii. Maximum of 300 mg has been given.
  - c. **Metoprolol**: 5 mg IV every 5 minutes to a maximum of 3 doses.

## Aortic Aneurysm/ Aortic Dissection (continued)

8. If patient remains SBP  $\geq$ 120
  - a. **Nicardipine:** 2.5 mg/hr. Increase every 15 minutes to a maximum of 15 mg/hr.
9. If patient is hypotensive, Target SBP 80-100 mmHg
  - a. Treat based on *Hypotensive/ Pressor Protocol* based on orders from accepting vascular surgeon.
  - b. Initiate circulatory volume replacement based on *Blood Productions Administration Protocol*.
10. Update receiving facility of changes in patient condition so that appropriate changes to treatment plan can be made prior to patient arrival.

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### Tier III

11. If patient remains SBP  $\geq$ 120 despite above medication treatments
  - a. **Nitroprusside infusion:** 50 mg in 250 mL D5W. Start at 0.5 mcg/kg/min. Titrate every 5 minutes by 0.5-1.0 mcg/kg/min. Maximum dose of 10mcg/kg/min.

**F. Patient Care Procedures-Trauma**





## Trauma Care Overview

### Tier II & Tier III

Trauma continues to be the largest cause of morbidity and mortality among many age groups, especially those in the younger categories. Rapid stabilization and transport to a Trauma Center is of the utmost importance in order to provide the patient the best opportunity for survival and recovery. Recent changes in trauma criteria by the American College of Surgeons have moved to include injuries such as burns so to combine the specialty expertise of a Burn Center with the resources of a Trauma Center as an example of how combining expert services can improve patient outcomes.

### Assessment

As traumatic injuries result from a multitude of potential forces that could impact the body, safety of the CCT team must always be of priority to all members of the team. In addition to continual scene assessment for the purposes of scene safety, the CCT team should also be evaluating the scene for clues about the situation that caused the injury (Mechanism of Injury).

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview*.
2. Maintain cervical spine restriction.
  - a. Region 3 trauma protocols allow for patients to be transported with spinal precautions (as opposed to spinal restrictions) if all of the following agree that doing so does not present an increased likelihood of difficulties during transport.
    - i. Transferring physician
    - ii. Receiving physician
    - iii. CCT team
3. Perform head to toe rapid trauma exam. Treat any life threats as found.
4. Ensure copies of all radiography studies have been forwarded to receiving facility. If at all possible take a copy with patient.
5. Administer 100% Oxygen via NRB. Secure advanced airway as needed based on *Advanced Airway/RSI Protocol*.
6. Initiate 2 large bore IV sites,
  - a. If unable to establish two IV access points, the CCT team should consider the need for IO access.
  - b. **0.9% Normal Saline:** 500 mL IV infusion.
  - c. Seek to maintain SBP  $\geq$  90 mmHg.
  - d. Limit fluid resuscitation of **0.9% Normal Saline** to TKO unless patient is hypotensive.
7. In significant hemorrhage is suspected (internal or external), administer blood products based on *Blood Product Administration Protocol*.

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**Trauma Care Overview (continued)**

8. If vital signs indicate for inclusion criteria, treat based on *Tranexamic Acid/ TXA Protocol*.
9. Provide pain medication based on *Pain Management Protocol* so long as SBP allows.
10. Perform secondary assessment during transport. Continue to search for potential life threats and treat as found.
11. Refer to Complex Patient Protocol for exclusion criteria for Tier II providers.



## Tranexamic Acid/ TXA

### Tier II & Tier III

Traumatic injuries continue to be the leading cause of death in patients under forty years of age. Even in this otherwise healthy subset of the population, the devastating effects of traumatic injuries are emphasized by the morbidity and mortality of trauma. Research has come to understand what has been termed the cascade of events that greatly decreases the patient's ability to survive the injury. Noted events in this cascade include coagulopathy and acidosis leading to multisystem organ failure. Some studies have shown Tranexamic Acid to improve clotting ability while reducing the magnitude of the inflammatory response by the body. However, it has shown to have a minimally increased effect on the likelihood that the patient will develop a DVT/PE. Recent evidence shows it may increase mortality in certain populations of trauma patients.

### Assessment

When considering the appropriateness of Tranexamic Acid therapy, all of the following inclusion criteria must be considered.

#### Inclusion criteria

All of the following criteria must be met for the administration of Tranexamic Acid.

1. Patient age of 18 years or older.
2. Penetrating trauma to chest, abdomen or pelvis with S/S of hemorrhagic shock.
  - a. Likely to need massive transfusion.
  - b. Sustained tachycardia HR >110.
  - c. Sustained hypotension SBP < 90 mmHg.
3. Signs of peripheral vasoconstriction
  - a. Cool, pale skin.
  - b. Delayed cap refill.
4. **Injury occurred  $\leq$  3 hours prior to TXA administration.**
5. Consult **Medical Control** for orders prior to TXA administration.

#### Absolute exclusion criteria

1. Head injury
2. Time of injury > 3 hours or unknown.
3. Patients who antifibrinolytic therapy is contraindicated.
  - a. A history of DVT/PE or procoagulant disorder (i.e. protein c, protein s or Anithrombin III disorder)
4. Age less than 18

**Tranexamic Acid/ TXA (continued)**

**Treatment and Interventions**

14. Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.
15. **Tranexamic Acid:** 1 g in 100 mL 0.9% Normal Saline over 10 minutes IV infusion.
16. **Tranexamic Acid:** 1 g in 500 mL 0.9% Normal Saline over 8 hours IV infusion.



## Musculoskeletal Trauma

### Tier II & Tier III

Musculoskeletal Trauma is the most frequent trauma that EMS is called to treat. While the mortality of such injuries is less than other forms of trauma, the morbidity of such injuries can be lifelong. While assessment and treatment of life threatening injuries is the priority of treatment, proper management of musculoskeletal injuries can lead to dramatically better patient recovery from the traumatic event.

### Assessment

During the head to toe rapid physical exam the CCT team should look for any observable injury that could compromise circulation. Such injuries should be addressed when found. During the secondary assessment a more comprehensive assessment should be completed. All injuries should be assessed and treated.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.
2. If uncontrolled hemorrhage is noted/ develops
  - a. Apply direct pressure.
  - b. Elevate extremity as possible.
  - c. Use pressure points to reduce blood flow.
  - d. Consider the use of cold packs without direct contact to skin.
  - e. Apply Combat Application Tourniquet.
3. If soft tissue injuries are noted/ develops
  - a. Control bleeding.
  - b. Dress with sterile bandage/ dressing.
4. If fracture noted/ develops
  - a. Assess PMS. Include in PCR. If intact proceed to #c. Use Doppler as needed to assess circulation.
  - b. If circulation compromised, provide manual traction to realign injury. Reassess PMS after manipulation.
  - c. Splint effected extremity. Include joint/ long bone above and below injury.
5. If S/S of pelvic injury
  - a. Apply SAM Pelvic sling.
6. If amputated part
  - a. Wrap affected part in sterile saline soaked dressing.
  - b. Secure affected part in watertight container.
  - c. Immerse container in ice filled secondary container.
  - d. Dress extremity stump with sterile saline dressing. Control bleeding as needed.

## Facial Trauma

### Tier II & Tier III

A large variety of forces can lead to facial trauma. Patients with facial trauma present significant concerns due to the potential disruption of respiration. Additionally, the concentration of blood vessels in the face and head increase the difficulty that bleeding can create. Special attention must be paid to accessing the patient in the position found and monitoring airway status during and after any movement of the patient due to the positional nature of airway difficulties.

### Assessment

The primary assessment must focus on identifying and treating life threats. Primarily this will focus on the patency and maintenance of the airway. The secondary assessment should include a detailed exam of face and head addressing all injuries that are found.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.
2. Closely assess patient's ability to maintain their own airway. If concerns regarding airway compromise, initiate *Advanced Airway/ RSI Protocol*.
3. If unable to provide adequate respiration immediately proceed to *QuickTrach / Emergency Cricotomy Protocol*.
4. Maintain full spinal restrictions.
5. If gastric tube is required orogastric placement should be used unless isolated external injury is confirmed.
6. If CSF is present in nasal or ear draining
  - a. Collect draining, but do not pack wound or apply pressure.
  - b. Antimicrobial treatment should be started by transferring facility prior to CCT arrival. If not, CCT should work with transferring and receiving facility to establish orders and initiate treatment for continuation during transport.
7. If eye injury
  - a. Treat eye exposure to chemicals based on *Toxic Exposure Protocol*.
  - b. If injury to globe, protect with rigid structure over affected eye. Cover unaffected eye with patch or dressing to reduce movement of affected eye.
8. If penetrating object
  - a. Stabilize in place unless object prevents airway maintenance.
  - b. If unable to provide adequate respiration immediately proceed to *QuickTrach / Emergency Cricotomy Protocol*.
  - c. If time permits, consult Medical Control regarding best mechanism to stabilize penetrating object.

## Thoracic Abdominal Trauma

### Tier II & Tier III

Given the close proximity to major vessels, organs and organ systems, trauma to the chest and abdomen have great potential to interrupt circulation. Attention much be focused on identifying chest trauma as well as working to correct the effects of that trauma on perfusion.

### Assessment

Assessment of the chest, respiration and circulation are included in every patient assessment. For the patient suspected of suffering from chest trauma, additional, continued attention is required to identify and correct potential threats to circulation. Additional, regular assessment of JVD, tracheal positioning, lung sounds and heart tones should be included in the continued assessment.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.
2. Closely assess patient's ability to maintain their own airway. If concerns regarding airway compromise, initiate *Advanced Airway/ RSI Protocol*.
3. If unable to provide adequate respiration immediately proceed to *QuickTrach / Emergency Cricotomy Protocol*.
4. Maintain full spinal restrictions.
5. Stabilize any penetrating/ impaled objects.
6. If open wound to chest or abdomen cover with occlusive dressing on at least 3 sides.
  - a. Be alert for the development of pneumothorax.
7. If open wound to abdomen with evisceration
  - a. Cover organs with saline sterile dressing.
  - b. Cover initial dressing with occlusive dressing.
8. If S/S of pneumothorax or tension pneumothorax treat immediately treat based on *Needle Thoracostomy Protocol*.
  - a. If chest tube has been placed by transferring facility, assess chest tube and drain system. If pneumothorax re-develops treat with additional needle thoracostomy.
9. If flail segment or suspected aortic injury watch for increasing intrathoracic pressure intubation could create.

## Spinal Trauma/Cord Injury

### Tier II & Tier III

Survival post spinal trauma/ cord injury is one of the most difficult injuries for the patient to recover from. Even when full recovery is not possible, extensive treatment, rehabilitation, and modification is required for the patient to return to their pre-injury capabilities. Potential spine/ cord injuries should be treated with great caution and preventative care.

### Assessment

Assessment of the potential spinal trauma/ cord injury should be included in the assessment of all trauma patients. Special attention should be focused on assessing PMS as well areas of pain. Mechanism of injury should also be considered when assessing a patient for potential spine and or cord injury.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.
2. Maintain full spinal restrictions.
3. Closely assess patient's ability to maintain their own airway. If concerns regarding airway compromise, initiate *Advanced Airway/ RSI Protocol*. For high spinal injuries, consider placement of advanced airway prior to departure from transferring facility.
4. If unable to provide adequate respiration immediately proceed to *QuickTrach / Emergency Cricotomy Protocol*.
5. Document any areas of gross neurological deficits in PCR as well as the time the deficits were noted. Incomplete injuries can create a range of losses that can lead the patient to be even more confused and concerned.
6. Consider pre-treatment for nausea/ vomiting based on *Nausea and Vomiting/ Acute Bowel Obstruction Protocol*.
7. Treat pain based on *Pain Control Protocol*.
8. Treat for neurogenic shock based on *Hypotension/ Pressor Protocol*.
9. If steroid treatment has been initiated based on the request of the transferring or receiving facility, they can be continued with written order. No additional administration by CCT team shall occur.



## Traumatic Brain Injury

### Tier II & Tier III

Traumatic Brain Injury is a life threatening condition, that even when survived can lead to lifelong changes in the patient's ability to function and interact as compared to their pre-injury status. Airway maintenance and appropriate cerebral perfusion are of the utmost importance. Consistent monitoring of GCS is vital to note changes in the patient's condition.

### Assessment

Assessment should focus on the aggressive search for signs and symptoms of injury and noting and changing in those signs and symptoms throughout transport. The CCT team should be attentive to the severity of TBI:

GCS	15-13	12-9	8-3
TBI Severity	Mild	Moderate	Severe

Herniation and increased ICP are among the biggest concerns for patients with severe TBI. The CCT team should be alert for signs of increased ICP

- Behavior changes (GCS changes on 2 points or more from patient's best score)
- Decreased consciousness
- Headache
- Lethargy
- Neurological symptoms, including weakness, numbness, eye movement problems, and double vision
- Seizures
- Vomiting

The increased ICP, if not addressed, can lead to herniation. The CCT team should be monitoring for signs such as

- Decreased LOC
- Posturing
- Unequal pupils
- Cushing's Reflex
  - Bradycardia
  - Hypertension
  - Irregular Respirations

## Traumatic Brain Injury (continued)

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.
2. Closely assess patient's ability to maintain their own airway. If concerns regarding airway compromise, initiate *Advanced Airway/RSI Protocol*. For high spinal injuries, consider placement of advanced airway prior to departure from transferring facility.
3. Frequently assess GCS and include in PCR.
4. Maintain patient positioning based on orders or transferring and receiving physicians.
5. If patient is intubated refer to transfer order or maintain ETCO<sub>2</sub> at 35-40 mmHg.
6. **0.9% Normal Saline:** TKO unless SBP < 90 mmHg.
7. Work to decreased ICP
  - a. PEEP < 5 unless needed to maintain SPO<sub>2</sub>
  - b. Removal of any possible constrictive devices and clothing on head, face and neck.
  - c. Treat nausea based on *Nausea and Vomiting/ Acute Bowel Obstruction Protocol*.
  - d. Treat seizures based on *Seizure Protocol*.
  - e. Treat pain based on *Pain Control Protocol*.
  - f. Treat anxiety based on *Patient Sedation Protocol*.

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### Tier III

8. **Mannitol:** 0.5-1.0 g/kg IV over 5-10 minutes with **Medical Control**. Filter must be used.

## Crush Injuries

### Tier II & Tier III

While typically an isolated extremity injury, crush injuries, and ultimately, crush syndrome, can lead to a state of decreased circulation that can compromise that affected areas ability to survive. In significant cases, the resulting toxin build up in the affected area, can impact vital organ and organ systems throughout the body. The most concerning results can include rhabdomyolysis, metabolic acidosis and acute renal failure.

### Assessment

Assessment, as well as treatment, focus on two separate time frames: pre and post extrication. In rare cases the CCT team will be on scene and begin treatment of the patient pre-extrication. In this situation the CCT team should would to assess the degree of injury and begin prophylactic treatment against the toxic buildup that is occurring.

Identification of injury capable of producing Crush Syndrome

- Any injury where the patient's lower extremity (or extremities) buttocks, upper thoracic region, or arms are compressed for a prolonged period or with significant injury to muscles and/ or circulation.
- 

### Treatment and Interventions

Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.

1. Closely assess patient's ability to maintain their own airway. If concerns regarding airway compromise, initiate *Advanced Airway/RSI Protocol*. For high spinal injuries, consider placement of advanced airway prior to departure from transferring facility.
2. Frequently assess GCS and include in PCR.
3. If initiating patient treatment by CCT team pre-extrication
  - a. **0.9% Normal Saline:** 1,000 mL wide open. Use pressure bags as needed. Additional fluid to maintain MAP 65.
    - i. **Avoid Potassium containing fluids, including Lactated Ringers.**
  - b. **Sodium Bicarbonate:** 50 mEq IVP
  - c. **Sodium Bicarbonate:** 50 mEq in 1 L 0.9% Normal Saline at 1,000 mL/ hr
  - d. **Sodium Bicarbonate:** 50 mEq IVP **immediately** before final steps of extrication when circulation is restored.
4. If extreme prolonged extrication, consult Medical Control for additional considerations.
5. Treat pain based on *Pain Control Protocol*.
6. Treat anxiety based on *Patient Sedation Protocol*.

## Crush Injuries (continued)

7. If hyperkalemia suspected, treat based on *Potassium Imbalance Protocol*.
8. Immobilize effected areas.
  - a. Do not elevate.
  - b. Apply cold therapy.
  - c. If fasciotomy done at transferring facility, cover with loose, sterile dressing.



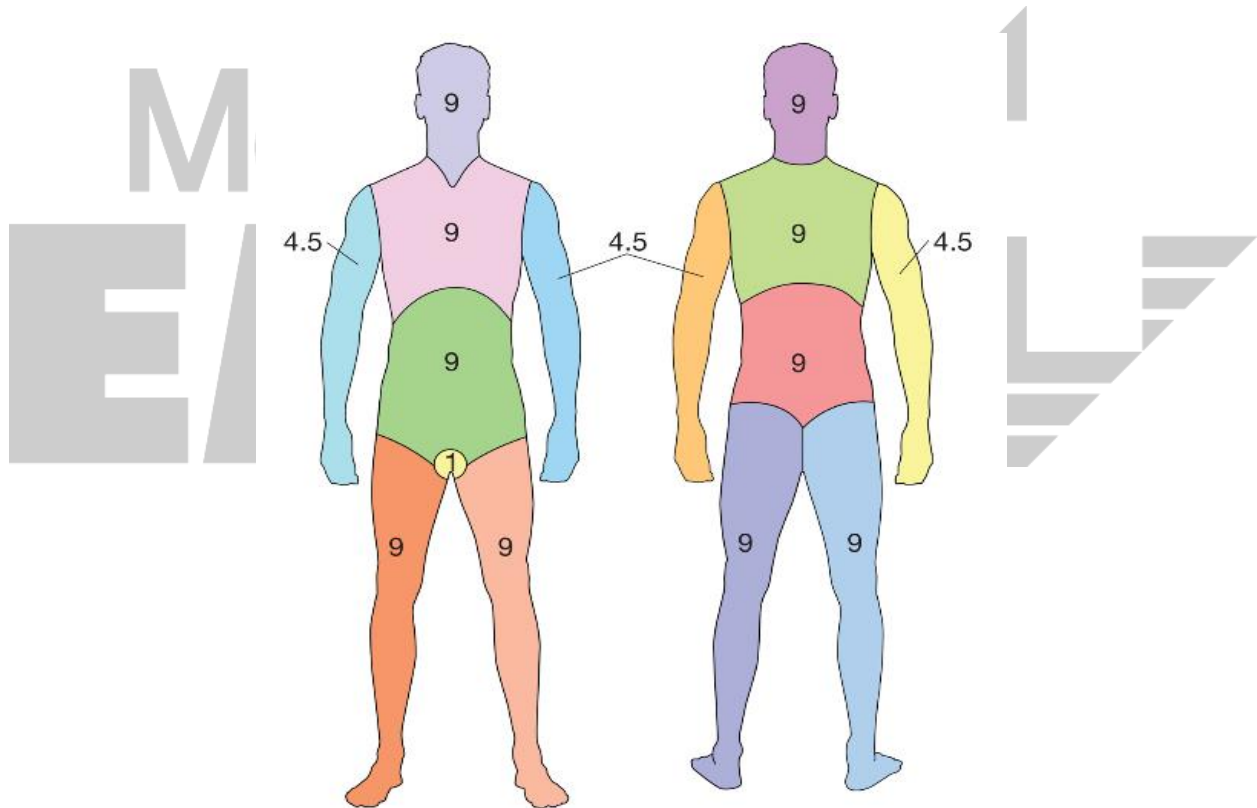
## Burn Trauma

### Tier II & Tier III

As most patients and their families are aware of the devastating nature of burn injuries, treatment of the burn patient includes medical and well as psychological care of the patient. Of the utmost importance is to ensure the burning process has been stopped and seeking to maintain a patent airway. Resuscitation should then focus on fluid resuscitation and treatment of developing acidosis.

### Assessment

After ensuring the safety of the CCT team and patient, the CCT team should begin the first of regular airway assessments. The burn should be identified as electrical, chemical or thermal. The CCT team should work to assess the Total Burn Surface Area.



### Treatment and Interventions

1. Ensure Scene Safety for the CCT team prior to establishing any patient contact.
2. Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.

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## Burn Trauma (continued)

3. Closely assess patient's ability to maintain their own airway. If concerns regarding airway compromise, initiate *Advanced Airway/ RSI Protocol*.
4. If unable to provide adequate respiration immediately proceed to *QuickTrach / Emergency Cricotomy Protocol*.
5. If possible, allow family to have a few moments with patient prior to departure.
6. If patient is not being transferred to a Burn Center, work with the transferring and receiving physicians as well as Medical Control to discuss best destination for patient.
7. Remove any restrictive jewelry or clothing.
8. Insert foley catheter with urometer if > 20% TBSA.
9. Dress burns will dry, sterile dressings. Cover patient to conserve body heat.
10. Treat pain based on *Pain Control Protocol*.
11. Treat anxiety based on *Patient Sedation Protocol*.
12. If hyperkalemia suspected, treat based on *Potassium Imbalance Protocol*.
13. If escharotomy is performed at transferring facility, cover with loose, sterile dressing.
14. **Lactated Ringers:** 2mL/ kg/ TBSA IV infusion.
  - a. 50% of fluids to be infused over first 8 hours.
  - b. 50% of fluids to be infused over next 16 hours.
15. If electrical burn
  - a. Fully immobilize the patient due to forces of electrical current and possible trauma.
  - b. Assess for entry and exit wounds. No cooling or flushing is necessary due to the type of burn.
  - c. Cover the burn with dry, sterile dressings.
  - d. Closely monitor cardiac rhythm of the patient.
14. If chemical burn
  - a. Consider possible scene and patient contamination and follow agency safety procedures.
  - b. Note which chemical agent caused the burn and obtain the MSDS for that chemical (if possible).
  - c. The patient's clothing should be completely removed to prevent continued exposure and the patient decontaminated **prior to** being placed in the ambulance for transport.
  - d. Dry chemical powder should be brushed off before applying water.
  - e. Irrigate the patient with sterile water and if the MSDS indicates use of water will not cause an adverse reaction. Body parts should be flushed for at least 1-2 minutes. Do not use sterile saline on chemical burns.
  - f. Irrigate burns to the eye with sterile water utilizing Murphy Lens for at least 20 minutes. Alkaline burns should receive continuous irrigation throughout transport.

## Near Drowning

### Tier II & Tier III

Drowning continues to be a significant cause of death among certain population groups. Near Drowning is the clinical diagnosis that is given for a patient who suffered a water exposure/submersion event but who was able to be resuscitated. The most critical timeframe for this patient is the first twenty-four hours where fluid aspiration and asphyxiation can lead to death. This timeframe is therefore identified as near drowning. Beyond the timeframe of the first twenty-four, Secondary Drowning is the diagnosis of the patient who survived the initial submersion event, but succumbed to resulting hypoperfusion and resulting hypoxia from lung injury.

### Assessment

Assessment at the drowning event must first ensure scene safety for the CCT team. Rescue must be handled by trained and equipped rescue teams. Coordinate with those teams regarding care that can be given prior to CCT team access.

Include in the assessment a review of the situation that resulted in the drowning. Typically, trauma, toxins, and/or other medical conditions are seen as factors that helped lead to the drowning event.

### Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.
2. Maintain full spinal restrictions.
3. Closely assess patient's ability to maintain their own airway. If concerns regarding airway compromise, initiate *Advanced Airway/RSI Protocol*.
  - a. **Albuterol:** 2.5 mg nebulizer or inline nebulize if signs of airway constriction noted. May repeat every 15 minutes.
  - b. If intubated is required, utilize PEEP starting at 5 cm water pressure and monitor Oxygen saturations.
4. If patient is intubated refer to transfer order or maintain ETCO<sub>2</sub> at 35-40 mmHg.
5. If unable to provide adequate respiration immediately proceed to *QuickTrach/ Emergency Cricotomy Protocol*.
6. Consider pre-treatment for nausea/ vomiting based on *Nausea/ Vomiting Protocol*.
  - a. If any decrease in level of consciousness, place gastric tube based on *Gastric Tube Protocol*.
7. Work to prevent heat loss. Initiate temperature monitoring based on *Temperature Monitoring Protocol*.
8. Suspect hypothermia and treat based on *Heat Related Illnesses Protocol*.
9. Resuscitate based on appropriate protocol(s)

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### Tier III

10. Status Post Arrest care based on necessary protocols.

**G. Appendix**





## Equipment Listing

### Administrative Supplies

- Memorial EMS ALS Ambulance supplies
- Drug Compatibility Chart
- 10 Transfer order Forms
- 10 Patient Care Log Forms
- 1 Hard Copy Memorial CCT Protocols

### Equipment

- Cardiac monitor
- Cardiac monitor holder for stretcher
- Capnography
- IV pole
- Fluid cooler/ Medication refrigerator
- Fluid warmer
- Thermometer (Tympanic)
- 2 Baxter Six Sigma Smart Pumps

### Drug Bag CCT

- CCT Medication Bag
- CCT Controlled Substances Bag- Refrigerated Bag
- Secured location for Controlled Substances Bag with only paramedic & RN access

### IV Supplies

- 10 IV Pump tubing sets
- 4 Vented IV pump tubing sets- Properly identified
- 5 Secondary IV Pump tubing sets, with drop loop-Properly identified
- 3 Blood Tubing
- 3 1000 mL Lactated Ringers
- 2 100 mL D5W
- 2 250 mL D5W
- 2 250 mL D10W
- 1 500 mL D5NS
- 3 SQ40S filter
- 3 Dial- a-Flow

### Airway Bag

- 1 Quicktrach kit
- 2 Decompression kits
- 3 Vent Circuits
- 1 Transport vent

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