STAT MedEvac

Critical Care Protocols

Effective May 1, 2012
STAT MedEvac Critical Care Protocols

Approval Date: March 26, 2012

Effective Date: May 1, 2012

Medical Director: [Signature]

President: [Signature]
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OXYGEN ADMINISTRATION

Criteria:
A. Patients meeting the following conditions:
   1. Patient protecting his/her airway.
   2. Respiratory rate is 10-32 breaths per minute (Adult).
   3. Does not meet criteria for additional airway control.

Exclusion Criteria:
A. Patient not protecting his/her own airway.
B. Adult patient with respiratory rate <10 or >32 breaths per minute, pediatric patient with apnea or irregular respirations – Refer to Protocol CC401 (Airway Management).

Procedure:
1. All transported patients will receive supplemental oxygen to maintain oxygen saturation of 96-100% and relieve respiratory distress.
2. Administer oxygen 2-6 lpm via nasal cannula.
3. Oxygen saturation < 95% (approx. PO2 74): apply non-rebreather face mask with oxygen at 15 lpm.
4. History of anemia, blood loss, or CO poisoning: apply non-rebreather face mask with oxygen at 15 lpm.
5. Oxygen saturation remains ≤ 95%: reassess clinical presentation and/or mechanical impairment and refer to appropriate protocol.
6. Oxygen saturation remains ≤ 90%: refer to airway protocol.

Performance Parameters:
A. Oxygen use on all appropriate patients.
B. Oxygen saturation ≥ 95%.
C. Use of airway protocol in timely manner for saturation ≤ 90%.
VASCULAR ACCESS AND FLUID ADMINISTRATION

Criteria:
A. Requirement or potential requirement for IV medications, fluid resuscitation, or hydration maintenance (i.e., all advanced life support or critical care patients).

Exclusion Criteria:
A. BLS fixed wing transport patients.
B. BLS ground transport patients.

Procedure:
1. Establish intravenous access in all patients as follows:
   a. Peripheral- two (2) attempts per crew member; if unsuccessful, proceed to external jugular (EJ) vein.
   b. External Jugular- if trauma patient, maintain in-line immobilization.
   c. Internal Jugular, Subclavian, Femoral - may be performed by Flight Physician.
2. If unable to establish IV access and patient is in extremis or has potential for serious decompensation, establish intraosseous access. In a peri-arrest or cardiac arrest patient, intraosseous access may be established as the primary vascular route.
   a. Site:
      1) Adult: Proximal tibia or proximal humerus
      2) Pediatric: Proximal tibia
   b. If patient is responsive to painful stimuli, slowly administer 2% lidocaine (preservative-free / cardiac) over 2 minutes prior to flushing site with 10 ml NSS:
      1) Adult: **40 mg (2 ml) 2% Lidocaine**.
      2) Pediatric: **0.5 mg/kg (0.025 ml/kg) 2% Lidocaine (maximum 40 mg)**.
3. If unable to establish IV access and patient is not in extremis or is not thought to likely experience serious decompensation, contact Medical Command.
4. If patient is already on a maintenance infusion of IV fluids (LR, NSS, D5LR, D5NS, or D5½NS [any with up to 40mEq KCl]), continue as previously ordered.
5. If patient is not already on a maintenance infusion of IV fluids:
   a. Adult Patient: Administer **NSS 100 ml/hr**.
   b. Pediatric Patient: Administer maintenance IV fluids as below (maximum rate: 100 ml/hr).
      - **NSS 4 ml/kg/hr** (for first 10 kg) +
      - **NSS 2 ml/kg/hr** (for kg 10-20) +
      - **NSS 1 ml/kg/hr** (for each kg over 20)

Performance Parameters:
A. Use of EJ for IV placement.
B. Use of central line for IV placement.
C. Use of Intraosseous route for patient in with potential for serious decompensation.
D. Appropriate administration of maintenance IV fluids.
ADMINISTRATION OF BLOOD

Criteria:
A. Any of the following:
   1. Blunt or penetrating trauma to the torso.
   2. Obvious massive external blood loss from any site.
   3. Abdominal or thoracic aneurysm.
   4. GI bleeding.
B. Patient has continued hypotension (Adult: SBP <90 mmHg, Pediatric: SBP <70 + [2 x age in yrs] mmHg) after 1 liter of crystalloid (Adult) or 60 ml/kg crystalloid (Pediatric). If the patient is in extremis and massive bleeding is suspected, blood can be initiated concurrent with the administration of saline based on protocol below).

Exclusion Criteria:
A. Blunt traumatic cardiac arrest patient.

Procedure:
A. Adult Patients
   1. Continue resuscitation with crystalloid solution and transfuse 2 units type "O" Packed Red Blood Cells (O negative if child-bearing age woman) via large bore IVs. Please consult medical command if blood is required (blood transfusion may be started prior to consult).
   2. Monitor patient for signs and symptoms of transfusion reaction. If symptoms of transfusion reaction are present STOP the blood products and administer Methylprednisolone (Solu-Medrol) 125mg IV and Diphenhydramine (Benadryl) 50mg IV. Contact Medical Command immediately.
   3. After initial two units of packed red blood cells transfused, contact Medical Command prior to any additional transfusions. If unable to contact Medical Command and patient continues to be hypotensive secondary to hypovolemia, continue to transfuse an additional 2 units Packed Red Blood Cells (obtained from referring facility).

B. Pediatric Patients
   1. Contact Medical Command for any blood product administration.
   2. Orders may include administration of 10 ml/kg Packed Red Blood Cells. Use a syringe to draw the blood from the bag and administer.
Notes:

A. *Signs of a transfusion reaction include (contact Medical Command if any are present):
   1. Fever
   2. Hypotension
   3. Hives
   4. Dyspnea or wheezing
   5. Tachycardia
   6. Rigors
   7. Abdominal pain, nausea, vomiting, or diarrhea

Performance Parameters:

A. Patient hypotension documented after 1 liter crystalloid.
B. Proper use of protocol for patient with above criteria.
C. Management of a transfusion reaction.
D. Avoiding use of packed red blood cells on the blunt traumatic cardiac arrest patient.
UPPER AIRWAY OBSTRUCTION – PEDIATRIC

Criteria:
A. Respiratory Distress.
B. Any of the following:
   1. Stridor
   2. Drooling
   3. Dysphagia
   4. Unusual position of comfort (sniffing position, torticollis)
   5. Barking cough

Exclusion Criteria:
A. Suspected foreign body obstructing airway - Refer to ALS Protocol #3001 (Airway Obstruction).

Procedure:
A. Refer to ALS Protocol #4023P (Croup/Stridor/Upper Airway Disease – Pediatric).
B. Additional/Preferred Procedures:
   1. Maintain calm, reassuring manner.
   2. Avoid noxious stimuli (i.e., invasive tests or IV).
   4. Administer high flow oxygen/cool mist via blow by.
   5. Keep warm.
   6. Administer Racemic Epinephrine aerosol 0.5 ml 2.25% solution (diluted in 3 ml NSS) inhaled; may repeat every 15 minutes if improvement noted.
   7. Allow child to assume position of comfort and do not restrain.
   8. Transport parent with child (if possible). Ensure that both patient and parent are separately and properly restrained.
   9. If patient becomes unconscious or respiratory failure ensues, go immediately to Protocol CC401 (Airway Management).

Performance Parameters:
A. Appropriate inclusion criteria documented.
B. Racemic Epinephrine use.
C. Need for intubation.
CARDIAC ARREST – TRAUMATIC

Criteria:
A. Patient in cardiac arrest from suspected traumatic cause.

Exclusion Criteria:
A. Patient that meets DOA criteria (including unwitnessed cardiac arrest of traumatic cause, decapitation, rigor mortis, etc.) – See BLS Protocol #322 (DOA) and Contact Medical Command.
B. Patient in cardiac arrest due to medical or non-traumatic causes – Refer to appropriate medical cardiac arrest protocol.

Procedure:
A. Refer to ALS Protocol #3032 (Cardiac Arrest – Traumatic).
B. Additional/Preferred Procedures:
   1. Intubation may be delayed to perform other life-saving maneuvers. Consider use of the King LT-D airway as the primary airway.
   2. Perform bilateral chest needle decompression for blunt trauma cardiac arrest or penetrating chest injury patients in cardiac arrest.
   3. IV/IO:
      a. IV fluid resuscitate.
      b. Do not administer Type O blood to the Blunt Trauma Cardiac Arrest Patient.
   4. Treat cardiac rhythm per appropriate protocol.
   5. Transport patient to closest facility by fastest possible means. Crew must contact Medical Command to change mode of transport or destination.
   6. Medical Command may order termination of resuscitative efforts.

Performance Parameters:
A. Airway management.
B. CPR performance.
C. Fluid resuscitation without using blood.
D. Needle decompression.
E. Destination selection.
POST-RESUSCITATION CARE

Criteria:
A. Patient that has return of spontaneous circulation (ROSC) after cardiopulmonary arrest. This includes resuscitation after CPR by EMS personnel and after CPR by first responders/laypersons with or without AED use.

Exclusion Criteria:
A. Patient in cardiac arrest who does not sustain a pulse (ROSC) after resuscitation. Continue to follow appropriate cardiac arrest protocol (VF/VT, PEA/Asystole).
B. Patients with ROSC after cardiac arrest from trauma. Continue to follow appropriate trauma protocol(s).
C. Patients with ROSC and active or recent bleeding (including gastrointestinal bleeding). Contact Medical Command for post-resuscitation care orders.
D. Patient whose cardiac arrest was due to hypothermia. Follow ALS Protocol #6081 (Hypothermia).

Procedure:
A. Refer to ALS Protocol #3080 (Post-Resuscitation Care).
B. Additional/Preferred Procedures:
   1. Sedate the patient as per Protocol CC402 (Sedation for Intubated Patients).
   2. Obtain initial temperature reading if available.
   3. Place an esophageal (preferred) or rectal temperature probe. Assess and document core body temperature with each vital signs assessment.
   4. Remove space blanket and any other coverings from the patient.
   5. Place ice packs in the axilla and groin.
   6. Medical Command may order infusion of a bolus of 20 ml/kg of cold saline as fast as possible using a pressure bag (maximum of 2 liters).
   7. If systolic blood pressure is < 110 mmHg, Medical Command may order Norepinephrine (Levophed) 0.05-0.5 micrograms/kg/min (50-500 nanograms/kg/min). Parameters:
      a. Goal is systolic blood pressure > 110 mmHg and/or improvement in tissue perfusion.
      b. Increase Norepinephrine (Levophed) by 0.05 micrograms/kg/min (50 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.5 micrograms/kg/min (500 nanograms/kg/min), recontact Medical Command.
      c. Contact Medical Command if there is development of ventricular dysrhythmia.
   8. Medical Command may order administration of Dobutamine at 5-20 micrograms/kg/min to maintain systolic blood pressure > 110 mmHg. Titrate by 5 micrograms/kg/min every 5 minutes to obtain goal SBP.
   9. If shivering occurs, Medical Command may order:
a. **Versed 2 mg IV** (adult) or **0.1 mg/kg** (pediatric, maximum 2 mg per dose). May repeat as directed.
b. If shivering continues, administer **Vecuronium 0.1 mg/kg IV.**

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Performance Parameters:

A. Documentation of initial temperature.

B. Maintaining SBP > 110 mmHg.

C. Providing adequate sedation.

D. Management of shivering.
AIRWAY MANAGEMENT

Criteria:
A. Any adult patient that requires airway management to assure adequate ventilation of a patent airway.
B. Oxygen saturation <90% (approximate \( \text{PO}_2 \) 58 mmHg) while receiving high flow oxygen and any of the following:
   1. Cardiac or respiratory arrest.
   2. Respiratory rate <10 or >32 breaths/min (Adult), irregular respirations or apnea (Pediatric).
   3. GCS ≤ 8.
   4. No gag reflex.
   5. Partial airway obstruction from blood/secretions or trauma.
   6. \( \text{PaCO}_2 \) > 55 mmHg, unless in chronic respiratory failure.
   7. Severe inspiratory retractions and use of accessory muscles.

Exclusion Criteria:
A. Patient with obstructed airway – See ALS Protocol #3001 (Airway Obstruction).

Procedure:
A. Refer to pertinent BLS/ALS protocols:
   1. ALS Protocol #2032 (Confirmation of Airway Placement).
   2. ALS Protocol #4001 (Airway Management).
B. Additional/Preferred Procedures:
   1. Insert oral and/or nasal airway and support ventilation with BVM and 100% \( \text{O}_2 \). Contact Medical Command prior to placement of nasal airway in a conscious child.
   2. If a STAT MedEvac videolaryngoscope is available, this must be used as the primary airway method and must be recorded whenever possible.
   3. If airway is presumed to be difficult and patient is >12 kg, consider primary use of the King LTS-D Airway. In the case of upper airway obstruction, seek anesthesia/ENT assistance, if available, before proceeding and contact Medical Command.
   4. For all patients not in cardiac arrest, perform Rapid Sequence Induction:
      a. Pretreatment for pediatric patients only: Administer Atropine 0.01 mg/kg IV (minimum 0.1 mg; maximum 0.5 mg).
      b. Sedation:
         1) For general medical and trauma patients (excluding active asthma/COPD exacerbation or sepsis/fever): Administer Etomidate (Amidate) 0.3 mg/kg IV (maximum dose 30 mg).
         2) For patients with active asthma/COPD exacerbation or sepsis/fever: Ketamine (Ketalar) 2mg/kg IV (maximum 200 mg; see contraindications below).
         3) If patient is hypotensive, provide sedation and address blood pressure per the appropriate shock protocol.
c. **Paralysis:** Administer **Succinylcholine (Anectine) 1.5 mg/kg IV** (maximum dose 200 mg; see potential complications and contraindications below). If contraindicated, administer **Vecuronium (Norcuron) 0.1 mg/kg IV** (maximum 10 mg) or **Rocuronium (Zemuron) 1 mg/kg** (maximum dose 100 mg; obtain at referring facility).

5. Perform endotracheal intubation or placement of a supraglottic airway:
   a. Ventilate with 100% O\textsubscript{2} using bag valve mask ventilation.
   b. Have one size smaller and one size larger ETT ready for use. Select cuffed tube size for Pediatric patients based on: (Age/4)+3 cuffed or (Age/4)+4 uncuffed.
   c. If upper airway obstruction: Attempt intubation with an ETT one size smaller than normally appropriate.
   d. Intubate or place supraglottic airway after muscular relaxation. If no jaw relaxation or decreased resistance to ventilation within 2 minutes, repeat **Succinylcholine 1.5 mg/kg IV** (maximum dose 200 mg). **Re-medicate only once.**
   e. Insert to appropriate ETT depth (e.g., internal diameter X 3; 10 + age in years [Pediatric]).
   f. If successful, confirm ETT placement (see below).

6. Guidelines for intubation attempts:
   a. Maximum 3 attempts at intubation (NO more than 2 attempts per crew member). If unable to intubate, access anesthesia or emergency physician assistance (if interfacility transport). If the intubation is difficult and patient is >12 kg, consider using the King LTS-D airway prior to the 3\textsuperscript{rd} intubation attempt.
   b. If unsuccessful with intubation and patient is >12 kg, insert the King LTS-D airway.
      1. If unsuccessful with King LTS-D placement (inability to ventilate or maintain O\textsubscript{2} saturations >90%) or for patients with contraindications to insertion of the King LTS-D airway (e.g. complete obstruction or caustic ingestion):
         a) Patients ≥8 years or ≥25 kg: Perform cricothyroidotomy.
         b) Patients <8 years or <25 kg: Perform bag valve mask ventilation with high flow oxygen and contact Medical Command.
   c. If unsuccessful with intubation and patient is <12 kg, perform bag valve mask ventilation with high flow oxygen and contact Medical Command.

7. ETT and King LTS-D (or other supraglottic airway device) confirmation:
   a. Required for all patients with advanced airways, including patients with advanced airways placed prior to crew arrival.
   b. Confirm tube placement by the absence of sounds over epigastrium, auscultation of breath sounds in axillae and anterior chest, and continuous in-line end tidal CO\textsubscript{2} monitor.
   c. Optional: Use colorimetric end tidal CO\textsubscript{2} detector (observe for color change after 5 ventilations).
   d. ETT for patients in cardiac arrest: Crew must additionally utilize esophageal detection device to confirm tube placement in patients age >1 year. The esophageal detection device is not reliable or recommended in patients <1 year of age.
e. King LTS-D airway in cardiac arrest: Confirmation will rely on chest movement, auscultation, and bag resistance. The esophageal detection device cannot be used with the King LTS-D. End tidal CO$_2$ may be detected with good quality CPR.

8. After intubation:
   a. Place all patients on ventilator. Refer to Protocol CC404 (Ventilator Settings – Adult) or consult Medical Command for ventilator settings for pediatric patient.
   b. Refer to Protocol CC402 (Sedation for Intubated Patients) and Protocol CC403 (Paralysis for Intubated Patients). Continuously assess patient for adequate sedation.
   c. Continuously monitor end tidal CO$_2$.
   d. Confirm proper endotracheal tube position after each patient transfer.

9. If oxygen saturation remains $\leq$95% after intubation (e.g. CHF, pneumothorax, mechanical failure): troubleshoot using the hypoxia checklist (Appendix B) and treat appropriately.

10. Gastric tube placement (oro gastric or nasogastric tube):
   a. If orotracheal tube has been placed, consider inserting a gastric tube and apply intermittent low suction.
   b. If a King LTSD has been placed, insert a gastric tube through the gastric port and apply intermittent low suction.

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**Notes:**

A. **Contraindications to Ketamine (Ketalar) use:**
   1. Known coronary artery disease (CAD) or cardiomyopathy.
   2. Any condition that may be associated with an increase in intracranial pressure, including known traumatic head injury with a GCS $<14$ and known intracranial hemorrhage (ICH). In such cases, use **Etomidate 0.3 mg/kg IV** (maximum 30 mg) regardless of chief complaint.

B. **Contraindications to Succinylcholine (Anectine) use:**
   1. Any condition associated with known or suspected hyperkalemia (potassium level $>5$ mEq), including sub-acute burns ($>48$ hrs), muscular dystrophy or suspected myopathy, non-acute paralysis, and renal failure.
   2. Neuromuscular disorders.
   3. Open globe injuries.
   In such cases, use **Vecuronium (Norcuron) 0.1 mg/kg IV** (maximum 10 mg) or **Rocuronium (Zemuron) 1 mg/kg IV** (obtain at referring facility; maximum 100 mg).

C. If intubation is unsuccessful in patients $\geq$8 years or $\geq 25$ kg, cricothyroidotomy may be performed immediately when anatomic or situation circumstances are poor for the use of the King LT-D.

D. Consider extratracheal manipulation to bring the cords into view.
E. Intubation Preparation:

<table>
<thead>
<tr>
<th>Intubation Preparation</th>
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</thead>
<tbody>
<tr>
<td>BVM and O₂ On</td>
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<tr>
<td>Suction On and Functioning</td>
</tr>
<tr>
<td>Functional IV</td>
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<tr>
<td>Pulse Ox and ECG Monitor</td>
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<tr>
<td>10ml Syringe</td>
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<tr>
<td>Tube(s)</td>
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<tr>
<td>Cuff check</td>
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<tr>
<td>Stylet</td>
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<td>Blade(s)</td>
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<tr>
<td>Handle</td>
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<tr>
<td>Light</td>
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<tr>
<td>Confirmation Device</td>
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<tr>
<td>Back-Up Plan</td>
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</tbody>
</table>

F. RSI Medication Dosing:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose (IV)</th>
<th>5 kg</th>
<th>10 kg</th>
<th>15 kg</th>
<th>20 kg</th>
<th>25 kg</th>
<th>30 kg</th>
<th>35 kg</th>
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<tbody>
<tr>
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<td>0.01mg/kg</td>
<td>0.1mg</td>
<td>0.1mg</td>
<td>0.15mg</td>
<td>0.2mg</td>
<td>0.25mg</td>
<td>0.3mg</td>
<td>0.35mg</td>
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<tr>
<td>Etomidate</td>
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<td>3mg</td>
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<td>6mg</td>
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<td>Vecuronium</td>
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<td>2 mg</td>
<td>2.5mg</td>
<td>3 mg</td>
<td>3.5mg</td>
<td>4mg</td>
<td>4.5mg</td>
</tr>
</tbody>
</table>

* Atropine dosing for pediatric patients (minimum 0.1 mg, maximum 0.5 mg).
G. Difficult Airway Algorithm:

H. Tube Confirmation Algorithm:

Performance Parameters:
A. Appropriate application of protocol in a timely manner.
B. RSI medication dosages correct.
C. Confirmation techniques utilized after intubation and with each move.
D. Appropriate performance of cricothyroidotomy.
E. Appropriate King LTS-D use.
SEDATION FOR INTUBATED PATIENTS

Criteria:
A. All intubated patients.

Exclusion Criteria:
A. Patients who are hemodynamically unstable (Adult – SBP <90 mmHg; Pediatric – SBP < 70 + [2 x age] mmHg). Contact Medical Command for further orders.

Procedure:
1. For patients who are not already receiving a sedative infusion (e.g. Propofol or benzodiazepine infusion), including newly intubated patients:
   a. Administer Midazolam (Versed) 0.1 mg/kg IV (maximum 2 mg) and Fentanyl 1 microgram/kg IV (maximum dose 100 micrograms).
   b. If SBP >100 mmHg and additional sedation is needed:
      1) Repeat Fentanyl 1 microgram/kg IV (maximum dose 100 micrograms) every 10 minutes as needed (maximum of 4 total doses).
      2) May repeat Versed 0.1 mg/kg IV (maximum dose 2 mg) in 10 minutes (maximum of 2 total doses).
   c. If additional sedation is needed or if patient requires analgesia, contact Medical Command.
2. For interfacility transfers of patients already receiving Propofol (Diprivan), continue this infusion and titrate to achieve adequate sedation (contact Medical Command if infusion is outside of the following parameters):
   a. Dosing Range: 10-50 micrograms/kg/min. Titrate by 10 micrograms/kg/min increments every 5 minutes to attain adequate sedation. Contact Medical Command if patient is not adequately sedated after a maximum of 50 micrograms/kg/min.
   b. Systolic blood pressure must be ≥100 mmHg (Adult) or >70 + [2 x age] mmHg (Pediatric). If SBP is below this, stop Propofol and contact Medical Command.
3. For interfacility transfer of patients already receiving a different sedative infusion, contact Medical Command for continuation of the sedative infusion or alternate sedation. Obtain orders for specific titration parameters.
   
4. Contact Medical Command if patient needs additional sedation not included above, including the initiation of Propofol (Diprivan).
Performance Parameters:

A. Use of proper dosage of medications.
B. Appropriate additional doses of sedatives to ensure adequate sedation.
C. Appropriate Medical Command Contact.
D. Use of sedation or analgesia for patients with hypotension.
PARALYSIS FOR INTUBATED PATIENTS

Criteria:
A. All intubated patients.

Exclusion Criteria:
A. None.

Procedure:
1. It is essential that all intubated patients receive adequate sedation. Refer to Protocol CC402 (Sedation for Intubated Patients).
2. If needed due to immediate patient or provider safety, consider administration of long-term paralytic: Vecuronium (Norcuron) 0.1 mg/kg IV (maximum 10 mg).
   a. Ensure that appropriate sedation is being provided for the patient. Patients may require multiple doses or titration of sedatives.
   b. Contact Medical Command for any patient who receives a nondepolarizing paralytic (e.g. Vecuronium, Rocuronium), except scene trauma patients, for possible change in ventilator settings due to loss of respiratory drive.
   c. Contact Medical Command for any patient who receives a nondepolarizing paralytic (e.g. Vecuronium, Rocuronium), who has had a seizure within the last 24 hours for discussion of antiepileptic use.
   d. Document the best neurologic exam possible prior to paralysis.

3. For patients who are asynchronous with the ventilator in spite of adequate sedation, contact Medical Command. Medical Command may order Vecuronium (Norcuron) 0.1 mg/kg IV (maximum 10 mg).

Performance Parameters:
A. Appropriate confirmation of ETT placement prior to paralysis.
B. Use of proper dosage of medications.
C. Repeat use of Fentanyl.
D. Appropriate Medical Command Contact.
E. Use of sedation or analgesia for patients with Systolic BP < 90mmHg.
VENTILATOR SETTINGS – ADULT

Criteria:
A. Trauma patients (scene or Interfacility) with a new advanced airway (e.g. orotracheal intubation or King LTS-D airway), including:
   a. Patients intubated by EMS prior to STAT MedEvac arrival.
   b. Patients intubated by STAT MedEvac crew.
   c. Patient intubated by hospital staff.
B. All interfacility patients with existing advanced airways that are already being ventilated prior to arrival.

Exclusion Criteria:
A. All medical patients with a new advanced airway (orotracheal intubation or King LTS-D airway). Contact Medical Command for ventilator settings.

Procedure:
1. Confirm endotracheal tube placement or King Airway placement as per Protocol CC401 (Airway Management).
2. Support ventilation as needed with BVM and 100% O₂.
3. Trauma patient with new advanced airway:
   a. Set ventilator to Assist Control.
   b. Tidal volume 8 ml/kg (maximum 800 ml).
   c. Rate: 12 breaths/min.
   d. F₁O₂: 100%.
   e. PEEP: 5 cmH₂O.
4. Interfacility ventilated patients with existing advanced airways:
   a. Continue previous ventilator settings (refer to Appendix C for ventilator set-up).
   b. Contact Medical Command if needed based on parameters below.
5. Assure adequate sedation as per Protocol CC402 (Sedation for Intubated Patients).
6. If patient is asynchronous with the ventilator in spite of adequate sedation, refer to Protocol CC403 (Paralysis for Intubated Patients).
7. Contact Medical Command immediately if:
   a. S₉O₂ < 95%.
   b. Peak airway pressure > 45 cmH₂O (or >30cm H₂O with King Airway).
   c. ETCO₂ > 45 mmHg for patients who are not suspected of elevated intracranial pressure.
   d. ETCO₂ > 40 mmHg for patients with suspected elevated intracranial pressure.
   e. ETCO₂ < 35 mmHg for all patients.
   f. Patient has known or suspected pneumothorax.
g. Patient is otherwise not tolerating initial ventilator settings.

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Note:

A. All patients with an advanced airway (whether meeting inclusion or exclusion criteria of this protocol) must be placed on a ventilator. Ventilator settings should be obtained based on this protocol and/or through Medical Command consultation as appropriate. Any deviation from this procedure should be in consultation with Medical Command.

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Performance Parameters:

B. Proper inclusion into protocol.
C. Initial ventilator settings appropriate.
D. Medical command contacted appropriately.
NON-INVASIVE POSITIVE PRESSURE VENTILATION (NIPPV) – ADULT

Criteria:
A. Patients in respiratory distress presumed to be from Acute Decompensated Congestive Heart Failure (CHF) or Chronic Obstructive Pulmonary Disease (COPD) who are awake and alert and able to follow commands.
B. Patient has any of the following, in spite of administration of high-flow oxygen:
   1. Pulse oximetry <90%.
   2. Respiratory rate >25 bpm.
   3. Use of accessory muscles during respiration.
C. Either:
   1. Patient being placed on NIPPV by STAT MedEvac crew.
   2. Patient placed on NIPPV by EMS or the referring facility prior to STAT MedEvac arrival.

Exclusion Criteria:
A. All patients unable to comply with instructions for NIPPV.
B. All patients with SBP <90 mmHg.
C. All patients who are actively vomiting.
D. All patients who do not tolerate the NIPPV mask.

Procedure:
1. Consider need for advanced airway management. Refer to Protocol CC401 (Airway Management)
2. If patient is not already receiving NIPPV but meets criteria for NIPPV as above:
   a. Place patient on high flow oxygen until NIPPV is prepared.
   b. Explain to the patient the need for NIPPV and the need for the tight-fitting mask.
   c. Size the patient for the appropriate mask.
   d. Initiate BiPAP using Pressure Support of 10 mmHg and PEEP of 5 mmHg.
3. If patient is already receiving NIPPV (CPAP or BiPAP) from a referring EMS agency or referring facility prior to STAT MedEvac arrival:
   a. Ensure that the patient understands the continued need for NIPPV and the need for the tight-fitting mask.
   b. If the patient is already on NIPPV with a mask that has ventilation holes, replace with an appropriately sized mask without ventilation holes.
   c. If patient is on BiPAP:
      1) Place patient on BiPAP matching the previous settings.
         Example: Patient is on Inspiratory Positive Airway Pressure (IPAP) of 10 mmHg and Expiratory Positive Airway Pressure (EPAP) of 5 mmHg. Place patient on Pressure Support of 10 mmHg and PEEP of 5 mmHg.
   d. If patient is on CPAP:
      1) If Pressure Support is ≤10 mmHg, place patient on BiPAP using Pressure Support of 10 mmHg and PEEP of 5 mmHg.
2) If Pressure Support is >10 mmHg, contact Medical Director on Call (MDOC) for ventilation orders.

4. Refer to Appendix C (LTV Quick Reference) for reference on setting up the transport ventilator.

5. If the patient does not tolerate NIPPV using the initial settings or SaO2 <95% after initiation of NIPPV, contact the Medical Director on Call (MDOC), who may order titration of the NIPPV settings or advanced airway management.

6. If patient is agitated, consult Medical Command for possible sedation or further airway control orders. Avoid sedation if SBP <90 mmHg or patient has decreased mental status.

Performance Parameters:
A. Proper inclusion criteria.
B. Initial ventilator settings appropriate.
C. Medical Command contacted appropriately.
D. Contacting Medical Director on Call (MDOC) when appropriate.
ASTHMA/COPD/BRONCHOSPASM

Criteria:
A. Patient with signs and symptoms of acute respiratory distress from bronchospasm or restrictive airway disease:
   1. Symptoms/signs may include:
      a. Wheezing – will have expiratory wheezing unless they are unable to move adequate air to generate wheezes.
      b. May have signs of respiratory infection (e.g. fever, nasal congestion, cough, sore throat).
      c. May have acute onset after inhaling irritant.
   2. This includes:
      a. Asthma exacerbation.
      b. COPD exacerbation.
      c. Wheezing from suspected pulmonary infection (e.g. pneumonia, acute bronchitis).

Exclusion Criteria:
B. Patient with obstructed airway – Refer to ALS Protocol #3001 (Airway Obstruction).

Procedure:
A. Refer to ALS Protocol #4022 (Asthma/COPD/Bronchitis).
B. Additional/Preferred Procedures:
   1. Ensure airway patency; administer high flow oxygen.
   2. Monitor continuous end-tidal CO$_2$ using nasal capnography. Contact Medical Command for readings above 50 mmHg.
   3. Administer Albuterol (Proventil) 5mg/3ml nebulized treatment. Repeat in 15 minutes to maximum of 2 treatments.
   4. Administer Ipratropium (Atrovent) 0.5mg/3ml nebulized treatment with first Albuterol treatment.
   5. Administer Methylprednisolone (Solu-Medrol):
      a. Adult: Methylprednisolone (Solu-Medrol)125 mg IV. Exception: Patient with COPD – Contact Medical Command before administering Solu-Medrol.
      b. Pediatric: Methylprednisolone (Solu-Medrol) 2 mg/kg (maximum 125 mg).
   6. If patient is in extremis or unresponsive to above therapy, administer epinephrine:
      a. Adult: Epinephrine 1:1,000 0.3 mg (0.3 ml) IM; may repeat at 15 minute intervals up to 3 total doses. NOTE: Caution should be undertaken in administering epinephrine to patients > 45 years of age or those with a past medical history of hypertension, angina or thyroid disease. In these patients, contact Medical Command.
b. Pediatric: Epinephrine 1:1,000 0.01 mg/kg (0.01 ml/kg) IM (maximum 0.3 mg or 0.3 ml); may repeat at 15 minute intervals up to 3 total doses.

7. If adult patient who remains dyspneic, consider non-invasive positive pressure ventilation (NIPPV). Refer to Protocol CC405 (Non-Invasive Positive Pressure Ventilation).

8. If the patient is in extremis or has any of the following:
   a. There is no improvement.
   b. The patient does not tolerate the mask.
   c. The patient has a change in level of consciousness.
   THEN move to Protocol CC401 (Airway Management).

9. In patients > 45 years of age or those with a past medical history of hypertension, angina or thyroid disease, contact Medical Command. Medical Command may order Terbutaline (Brethine) 0.25 mg SQ; may repeat dose X 3 at 30 minute intervals.

10. If patient is not responding to above therapy, contact Medical Command for further medication orders.

Performance Parameters:
   A. Appropriate use of medications.
   B. Appropriate use of NIPPV.
   C. Appropriate use of intubation.
   D. Medical Command contact.
SUSPECTED ACUTE CORONARY SYNDROME – ADULT

Criteria:
A. Adult patients with symptoms of possible cardiac ischemia. Diabetics, women, and elderly patients may have atypical symptoms without retrosternal chest pain. May include:
   1. Retrosternal chest heaviness/pressure/pain.
   2. Radiation of pain to arm(s), neck, or jaw.
   3. Associated shortness of breath, nausea/vomiting, or sweating.
   4. Possibly worsened by exertion.
   5. Patient with history of recent cocaine/amphetamine use.
   6. ST depression in multiple leads.
B. Patients diagnosed with an acute myocardial infarction.

Exclusion Criteria:
A. Patient not diagnosed with an acute myocardial infarction and chest pain/symptoms probably not of cardiac origin. May include:
   1. Pleuritic chest pain – worsens with deep breath or bending/turning.
   2. Patients less than 30 years old.

Procedure:
A. Refer to ALS Protocol #5001 (Suspected Acute Coronary Syndrome).
B. Additional/Preferred Procedures:
   1. If patient has not received aspirin in the previous 24 hours, administer Aspirin 324 mg (81mg x 4) by mouth.
   2. Administer Nitroglycerin 0.4 mg (1 spray or 1 tablet) sublingually every 3 minutes until pain relieved, maintaining systolic BP >100 mmHg.
   * Do not administer nitroglycerin to a patient who has taken Sildenafil (Viagra/Revatio) or Vardenafil (Levitra) within 24 hours.
   **Do not administer nitroglycerin to a patient who has taken Tadalafil (Cialis) within 48 hours.
   3. If no relief after 3 doses of sublingual Nitroglycerin and systolic blood pressure >100 mmHg, administer Morphine 2 mg IV every 5 minutes (maximum total dose 10 mg).
   4. If SBP <90 mmHg treat per Protocol CC705A-3 (Cardiogenic Shock).
   5. If patient is already receiving a Nitroglycerin infusion and SBP > 100 mmHg, continue Nitroglycerin infusion, based on the following parameters (Nitroglycerin infusion should be transferred at the bedside):
      a. Dosing Range: 10-200 micrograms/min. Contact Medical Command if patient is receiving a dose outside of this range.
      b. Titrate within dosing range by increments of 10 micrograms/min every 5 minutes until:
         1) Chest pain is relieved.
         2) Systolic BP <100 mmHg; hold Nitroglycerin infusion and contact Medical Command.
3) Decreased perfusion (e.g. cyanosis, decreased level of consciousness); hold
Nitroglycerin infusion and contact Medical Command.
4) Maximum dose reached; contact Medical Command.

*Note: DO NOT DELAY transfer of patient to initiate a Nitroglycerin infusion at the
bedside (unless patient was already on a Nitroglycerin infusion prior to transfer). Proceed with administering sublingual Nitroglycerin and/or Morphine as above until en route to the destination.*

6. If chest pain continues after administration of 3 doses of Nitroglycerine sublingually and 1
dose of Morphine IV and you are on route to the destination, initiate a Nitroglycerin
infusion, based on the parameters above.

7. For interfacility transfers of patients already receiving Heparin infusion, continue this
infusion based on the following parameters *(Heparin infusion may be held and restarted
in transport to expedite transfer)*:
   a. Dosing Range: **100-2000 units/hr**. Contact Medical Command if patient is receiving a
dose outside of this range.
   b. Monitor for any signs of bleeding. If bleeding is identified, stop Heparin infusion and
contact Medical Command.

8. For interfacility transfers of patients already receiving Eptifibatide (Integrilin) infusion,
continue this infusion based on the following parameters *(Integrilin infusion may be held
and restarted in transport to expedite transfer)*:
   c. Dosing Range: **1-2 micrograms/kg/min**. Contact Medical Command if patient is
receiving a dose outside of this range.
   d. Monitor for any signs of bleeding. If bleeding is identified, stop Eptifibatide (Integrilin)
infusion and contact Medical Command.

**Notes:**
A. The *Goal Bedside Time* for patients with STEMI is **less than 10 minutes**.

**Performance Parameters:**
A. Bedside time < 10 minutes for patient experiencing STEMI.
B. Administration of ASA for all patients without a contraindication.
C. Aggressive treatment of the patient’s pain.
D. Appropriate administration/continuation of infusions.
CONGESTIVE HEART FAILURE – ADULT

Criteria:
A. Patients presenting with shortness of breath from pulmonary edema/CHF, as indicated by:
   1. Severe dyspnea, tachypnea, bilateral rales, tachycardia, cough with frothy sputum, or
      orthopnea.
   2. No fever.
   3. May be associated with restlessness, agitation, pedal edema, diaphoresis, or pallor.
   4. Patient may have history of diuretic or digitalis use.
   5. Diagnosis based on chest xray.

Exclusion Criteria:
A. Patients presenting with shortness of breath from non-CHF etiologies:
   1. Pneumonia: WARNING – Patients with SOB from pneumonia may have symptoms similar
      to those of CHF, but these patients may be harmed by diuretics. Fever may be present in
      these patients.
   2. COPD exacerbation: These patients may take bronchodilators without a history of diuretic
      use.
   3. Pneumothorax: CPAP is contraindicated in these patients.

Procedure:
A. Refer to ALS Protocol #5002 (Congestive Heart Failure).
B. Additional/Preferred Procedures:
   1. Administer Nitroglycerin 0.4 mg sublingually or 1 spray sublingually every 3 minutes until:
      a. Dyspnea relieved.
      b. Systolic BP <100 mmHg.
      c. Decreased perfusion (e.g. cyanosis or decreased level of consciousness).
      * Do not administer nitroglycerin to a patient who has taken Sildenafil
         (Viagra/Revatio) or Vardenafil (Levitra) within 24 hours.
      ** Do not administer nitroglycerin to a patient who has taken Tadalafil (Cialis) within
         48 hours.
   2. If dyspnea continues or patient is already receiving a Nitroglycerin infusion and SBP > 100
      mmHg, initiate/continue Nitroglycerin infusion, based on the following parameters:
      a. Dosing Range: 10-200 micrograms/min. Contact Medical Command if patient is
         receiving a dose outside of this range.
      b. Titrate within the dosing range by increments of 10 micrograms/min every 5 minutes
         until:
         1) Dyspnea is relieved.
         2) Systolic BP <100 mmHg; hold Nitroglycerin infusion and contact Medical Command.
         3) Decreased perfusion (e.g. cyanosis, decreased level of consciousness); hold
            Nitroglycerin infusion and contact Medical Command.
         4) Maximum dose reached; contact Medical Command.
3. If patient remains dyspneic, consider non-invasive positive pressure ventilation (NIPPV).
   Refer to Protocol CC405 (Non-Invasive Positive Pressure Ventilation).
   IF any of the following:
   a. There is no improvement.
   b. The patient does not tolerate the mask.
   c. The patient has a change in level of consciousness.
   THEN move to Protocol CC401 (Airway Management).

4. If volume overload is suspected (e.g. increased weight gain or edema), Medical Command may order Furosemide (Lasix) 40mg IV.

5. If patient becomes hypotensive, Medical Command may order administration of:
   a. Dobutamine 5-20 micrograms/kg/min to maintain systolic blood pressure >90 mmHg.
      Titrate by 5 micrograms/kg/min every 5 minutes to obtain goal SBP.
   c. Norepinephrine (Levophed) 0.05-0.5 micrograms/kg/min (50-500 nanograms/kg/min). Increase Norepinephrine (Levophed) by 0.05 micrograms/kg/min (50 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.5 micrograms/kg/min (500 nanograms/kg/min), recontact Medical Command.

Performance Parameters:
   A. Administration of Nitrates for all patients without a contraindication.
   B. Appropriate continuation of Nitroglycerin infusion for interfacility transfers.
   C. Appropriate use of NIPPV for all patients without a contraindication.
AORTIC DISSECTION – ADULT

Criteria:
A. Patient meets any of the following criteria:
   1. Known thoracic aortic dissection.
   2. Suspected thoracic aortic dissection and severe, persistent chest pain.

Exclusion Criteria:
A. Diagnosed or suspected aortic aneurysm: Contact Medical Command.

Procedure:
1. If patient is currently receiving vasoactive medication (i.e., Nitroglycerin infusion), contact Medical Command prior to discontinuing this medication.
2. For pain management, administer Fentanyl (Sublimaze) 1 microgram/kg IV (maximum dose 100 micrograms) every 5 minutes until pain is controlled (pain described as 5/10 or less). Maximum is up to 4 doses of Fentanyl. If pain continues, contact Medical Command for further orders.
3. If systolic blood pressure is >120 mmHg and heart rate is >60:
   a. Administer Labetalol 10 mg IV. Target blood pressure is SBP <120 mmHg.
   b. If target blood pressure goal is not reached after 10 minutes and HR >60, administer Labetalol 20 mg IV (x 1).
   c. If target blood pressure goal is not achieved after administration of Labetalol, initiate Nicardipine (Cardene) 5 mg/hr IV. Titrate by 2.5 mg/hr every 5 minutes to meet target SBP <120 mmHg (maximum 15 mg/hr).
4. If SBP is >120 mmHg and heart rate is <60, initiate Nicardipine (Cardene) 5 mg/hr IV. Titrate by 2.5 mg/hr every 5 minutes to a goal SBP <120 mmHg (maximum 15 mg/hr).
5. If SBP decreases to ≤ 90 mmHg, contact Medical Command.

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6. If SBP is < 90 mmHg, Medical Command may order Norepinephrine (Levophed) 0.05-0.5 micrograms/kg/min (50-500 nanograms/kg/min) to maintain SBP > 90 mmHg. Increase Norepinephrine (Levophed) by 0.05 micrograms/kg/min (50 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.5 micrograms/kg/min (500 nanograms/kg/min), recontact Medical Command.
7. If patient remains hypotensive, consider hemorrhagic shock or cardiac tamponade – Refer to Protocol CC705A-1 (Hypovolemic Shock – Adult) or Protocol CC504 (Cardiac Tamponade).

Performance Parameters:
A. Inclusion and exclusion criteria for protocol.
B. Appropriate use of antihypertensives.
C. Patient’s pain is treated.
CARDIAC TAMPONADE

Criteria:
A. Patient with known cardiac tamponade.
B. Patient with all of the following:
   1. Penetrating or blunt chest trauma.
   2. Bilateral breath sounds present.
   3. Decreased SBP:
      a. Adult: SBP < 90 mmHg.
      b. Pediatric: SBP < 70 + (2 x age).
   4. Distant heart tones.
   5. Tachycardia, heart rate > 160/bpm.
   6. Distended neck veins (not always present due to hypovolemia).

Exclusion Criteria:
A. Cardiac tamponade excluded by imaging (e.g. ultrasound) at referring facility.

Procedure:
1. If patient was involved in trauma, assess as per Protocol CC602 (Trauma Assessment).
2. Ensure airway patency; administer high flow oxygen.
3. Establish IV access and monitor vital signs and cardiac rhythm. If patient is in extremis and no peripheral access, establish IO.
4. Fluid resuscitation with IV fluid bolus:
   a. Adult: 1-2 liters of NSS.
   b. Pediatric: 20 ml/kg NSS.
5. If SBP < 90 mmHg (adult) or SBP < 70 + (2 x age) mmHg (Pediatric) after initial volume resuscitation:
   a. Reassess breath sounds--are they equal?
      1) Yes -- Continue with protocol.
      2) No – Assume Tension Pneumothorax and perform needle decompression of diminished (affected) side.
   b. Reassess Heart tones--are they diminished?
      1) Yes – Continue with protocol.
      2) No – Refer to Shock Protocols.
   c. If ultrasound available, have referring facility perform to confirm presence of Cardiac Tamponade. If positive, consult Medical Command regarding a pericardiocentesis to be performed at the referring facility.
6. Continue fluid resuscitation.

NOTE: NOTIFY MEDICAL COMMAND/RECEIVING FACILITY OF PATIENT CONDITION AND POSSIBLE NEED FOR IMMEDIATE INTERVENTION UPON ARRIVAL.
Performance Parameters:

A. Documentation of inclusion criteria.
B. Fluid resuscitation.
C. Identification of tension pneumothorax as alternative cause of hemodynamic changes.
D. Application of appropriate shock protocols.
E. Appropriate Medical Command Contact.
INTRA AORTIC BALLOON PUMP – ADULT

Criteria:
A. Patient requires or is receiving cardiac support via an intra-aortic balloon pump.

Exclusion Criteria:
A. None.

Procedure:
**Do not remove or turn off referral IABP until IABP transfer is completed.**
1. **Assess the Patient** for:
   a. IABP insertion site, catheter size and type.
   b. Assess IABP settings.
   c. Assess platelet count, PTT, and INR.
   d. Assess IABP augmentation prior to arrival.
   e. Verify left radial and/or brachial pulses, urine output, and pedal pulses.
   f. Confirm IABP settings with referring staff.
2. **Power Up IABP** and connect to AC power source.
3. **Verify Adequate Helium Supply**.
4. **Verify IABP is in Autopilot/Operator Mode**.
5. **Transfer of IABP**:
   a. **Apply ECG Electrodes**: Apply 5 fresh ECG electrodes to the patient and mark them. Do not disconnect any existing electrodes until ready to transfer the patient to the transport IABP. Connect the ECG cable to the IABP ECG source.
   b. **Connect Arterial Line & Cables**: Connect arterial line cable to IABP console. Secure arterial line transducer to mid-axillary line and zero.
   c. **Fiber Optic Catheters**: If fiber optic catheter is used, slide in the fiber optic sensor and key card. The fiber optic catheter is zero’ed prior to insertion. Verify catheter is zero’ed by checking light bulb in upper left corner of display:
      1) **Green → Zeroed**.
      2) **Blue → Not zeroed and needs to be calibrated.** Refer to “Calibrating Fiber Optic Catheter” in Appendix E (IABP Reference).
   d. **Connect Helium Drive Line** tubing to IABP.
   e. **Verify Balloon Volume**: Verify that the balloon volume of catheter matches the volume on the pump.
   f. **Datascope IABP Adapter**: If Datascope IABP, verify balloon volume and connect appropriate size Arrow pump adapter.
   g. **Confirm Helium Filling Volume**: Ensure that the helium filling volume is correct for the balloon catheter size. Adjust the fill volume on the IABP console and select “Apply” after change is made.
   h. **Verify Trigger** recognition (ECG or A-line).
   i. **Select Desired Assist Ratio** (1:1 to 1:4).
j. **Mode Selection**: Check that the IABP is in the *Autopilot Mode*.

k. **Pump Status to “ON”**: Select Green pump status ON key.

l. **Ensure Proper Trigger**:
   1) The AutoCat Wave IABP will automatically select the best trigger for augmentation. Monitor and record the selected trigger. Most often, it will select the R wave of the ECG as the trigger. *It is important to provide the IABP with a good ECG signal.* The arterial pressure waveform or pacing spikes may also be used. If you need to change the trigger: Put into Operator Mode and select trigger, *then it must stay in Operator Mode*.
   2) If CPR is in progress, manually select *arterial pressure (AP)* as the trigger during resuscitation until spontaneous circulation is restored.

m. **Ensure Proper Timing**.
   1) Timing Quick Check:
      - SBP: Unassisted > Assisted
      - DBP: Unassisted > Assisted
      - MAP: Unassisted < Assisted
      - AUG: Unassisted > SBP
   2) Place the IABP into *Operator Mode* and change the augmentation to 1:2.
   3) Select “freeze” on right side of the screen and return IABP to 1:1 and “autopilot” while evaluating timing.
   4) Move purple cursor (right side of screen) down to evaluate timing (inflation should begin at the onset of diastole and end at the onset of systole, just prior to the dicrotic notch.
   5) Autopilot mode will usually result in proper timing of inflation and deflation of the intra-aortic balloon. If timing is not optimal, manual adjustment may be required by putting the IABP into Operator Mode and using the arrows located at left (inflation) and right (deflation) of the screen. **If you change the timing, the IABP must stay in Operator Mode**

6. **Secure Affected Lower Extremity**: Secure the affected lower extremity with a soft restraint on the same side as the balloon catheter insertion site. Prevent balloon flexion at the hip (*do not sit patient up >30°; patient should be log-rolled only*).

7. **Remove Referring ECG Electrodes**: The referring facilities’ ECG electrodes may be disconnected/removed once all transfer to the transport IABP is complete.

8. **Assess and Document**:
   a. Insertion site/type of catheter.
   b. Platelet count/anticoagulation (PTT/INR).
   c. Augmented pressures.
   d. Radial/pedal pulses (every 30 minutes). Loss of pulse may indicate a displaced catheter.
   e. Urine output. Urine output <30 ml/hr may indicate a displaced catheter.

10. **In the Event of IABP Device Failure**: Attach a 60 ml Luer Slip-Tip syringe to the balloon catheter and cycle the balloon manually once every 10 minutes. Notify MDOC immediately for further instructions.

11. **Contact MDOC** for any changes required to augmentation rates or changes in patient condition after transfer from bedside to AutoCat transport IABP.

12. **In the Event of Double Sensing or Timing Failure**: Check the ECG leads and connections. Contact MDOC for additional troubleshooting instructions. MDOC may order switching to *Operator Mode* and/or changing the trigger.

**Performance Parameters:**
- A. Use of fresh ECG electrodes.
- B. Documentation of trigger, timing, and augmentation.
- C. Use of soft restraints on the extremity with the balloon pump inserted.
- D. Documentation of appropriate catheter and balloon size.
VENTRICULAR ASSIST DEVICE

Criteria:
A. Patient has an existing portable implanted ventricular assist device.

Exclusion Criteria:
A. Patient has a newly implanted ventricular assist device. Contact Medical Command for additional orders.

Procedure:
1. Assess pump function and circulation:
   a. Listen to motor of pump over heart and/or left upper quadrant and observe green light on system control device.
   b. Assess perfusion based on mental status, capillary refill, and skin color. The absence of a palpable pulse is normal for patients with a functioning VAD; they may not have a palpable blood pressure.
   c. Obtain blood pressure using Doppler.
2. Check the Controller for any alarms and refer to Appendix F (Ventricular Assist Device Reference)
3. Bring patient’s power unit and batteries during the transport.
4. If patient experiences cardiac arrest, DO NOT PERFORM CPR. Contact Medical Command immediately.
5. Provide cardiac monitoring. If patient experiences a dysrhythmia, contact Medical Command.
6. If patient has evidence of hypoperfusion (defined as poor perfusion based on altered mental status, prolonged capillary refill, or poor skin color):
   a. Establish vascular access. Refer to Protocol CC211 (Vascular Access and Fluid Administration).
   b. Initiate 500 ml NSS bolus under pressure and contact Medical Command.
   c. Reassess patient after each intervention.
7. If patient continues to have evidence of hypoperfusion (defined as poor perfusion based on altered mental status, prolonged capillary refill, or poor skin color): Contact Medical Command.
   a. Medical Command may order an additional 500 ml NSS bolus.
   b. Medical Command may order Norepinephrine (Levophed) 0.05-0.5 micrograms/kg/min (50-500 nanograms/kg/min) until there is improvement in tissue perfusion. Increase Norepinephrine (Levophed) by 0.05 micrograms/kg/min (50 nanograms/kg/min) every 10 minutes to achieve improvement in tissue perfusion. If goal not reached at 0.5 micrograms/kg/min (500 nanograms/kg/min), recontact Medical Command.
Performance Parameters:
   A. Appropriate assessment of perfusion.
   B. Appropriate management of hypoperfusion.
VENTRICULAR ECTOPY – ADULT

Criteria:
A. Patient with any of the following and chest pain or hypotension:
   1. R-On-T PVCs.
   2. R-On-P PVCs.
   3. Episodes of non-sustained ventricular tachycardia (VT).
   4. Multifocal premature ventricular contractions (PVC).

Exclusion Criteria:
A. None.

Procedure:
1. Ensure airway patency and administer high flow oxygen as per Oxygen and Airway protocols.
2. Consider treatable causes:
   a. Hypoxemia.
   b. Alkalosis/Acidosis.
   c. Electrolyte imbalance (Hypokalemia, Hypomagnesemia).
   d. Digitalis toxicity.
3. Medical Command may order Amiodarone 150 mg IV over 10 minutes. An Amiodarone infusion can then be established at 1mg/min. Monitor for hypotension.
4. Medical Command may order administering Lidocaine 1.5 mg/kg IV over 2 minutes (heart rate must be ≥ 60 bpm); if < 60 bpm, contact Medical Command. If ectopy is suppressed, initiate Lidocaine infusion at 2 mg/min.
5. Medical Command may order Magnesium Sulfate 1-2 gm IV over 15 minutes. Monitor for hypotension.

Performance Parameters:
A. Inclusion criteria for protocol.
B. Consideration of underlying causes and their treatment.
C. Appropriate use of antidysrhythmics.
TRAUMA ASSESSMENT

Criteria:
A. Known or suspected trauma.

Exclusion Criteria:
A. Traumatic Cardiac Arrest – Refer to Protocol CC332 (Cardiac Arrest – Traumatic) and ALS Protocol #3032 (Cardiac Arrest – Traumatic).

Procedure:
A. Refer to applicable BLS/ALS protocols:
   1. BLS 601 – Bleeding Control.
   2. BLS 602 – Multisystem Trauma or Traumatic Shock.
   3. BLS 632 – Impaled Object.
   4. ALS 6002 – Multisystem Trauma or Traumatic Shock.
B. Additional/Preferred Procedures:
   1. PRIMARY SURVEY – This survey should be performed simultaneously with initial resuscitative measures.
      a. AIRWAY
         1) While stabilizing the cervical spine, ensure airway patency per airway protocols.
         2) If intubation is necessary, open the collar during intubation and maintain manual in-line stabilization.
      b. BREATHING
         1) O₂: maintain SaO₂ >95%.
         2) Assist ventilation as needed.
         3) Place occlusive dressing on open pneumothorax (sucking chest wound) on three sides; observe for tension pneumothorax (increased dyspnea, hypotension, and cyanosis) and briefly release dressing if these signs occur.
         4) Tension pneumothorax: Perform needle decompression as per Protocol CC613 (Tension Pneumothorax). If at a hospital, placement of a chest tube by referring physician is preferred after needle decompression.
      c. CIRCULATION
         1) Assess rate and quality of pulse and blood pressure (Do Not rely solely on automated blood pressure monitors; correlate with manual BP at each phase of mission).
         2) Direct pressure to control bleeding (if direct pressure is not sufficient or not feasible, use a hemostatic dressing).
         3) Two large bore IVs NSS to maintain SBP > 90 mmHg or MAP >65 mmHg. NOTE: Do not delay transport to initiate IV lines; IVs can be initiated during transport.
         4) Consider IO access for pediatric and adult patients without IV access.
         5) Initiate and continue cardiac monitoring.
         6) Check a venous lactate level (capillary if no IV access is available).
a) If patient has lactate level ≥4 mmol/L and patient has NOT sustained penetrating trauma, administer **500 mL NSS** (adult) or **20 ml/kg** (pediatric) and contact Medical Command. Administer additional IVF fluids based on Protocol [CC705A-1](Hypovolemic Shock – Adult) or Protocol [CC705P](Shock – Pediatric) or Medical Command order.

b) If lactate level is ≥4 mmol/L in a patient who has sustained penetrating trauma, contact Medical Command.

c) If patient is in shock, administer IVF fluids based on protocol [CC705A-1](Hypovolemic Shock – Adult) or Protocol [CC705P](Shock – Pediatric) or Medical Command order.

d) If transport is >30 minutes, repeat lactate level in 30 minutes and contact Medical Command if lactate level is ≥4 mmol/L.

7) Rapid transport to trauma center per trauma destination protocol.

8) If patient remains hypotensive after 2L NSS, contact Medical Command for blood administration orders.

2. **SECONDARY SURVEY** – Complete in-transit if patient is unstable.

a. **HEAD**

   1) Assess for signs of trauma, including scalp lacerations/bleeding and skull deformities.
   2) Assess for rhino/otorrhea.
   3) Assess pupillary size and reactivity.

   **Definitive Care:**
   1) Control bleeding with direct pressure.

b. **MAXILLOFACIAL**

   1) Reassess adequacy of airway.
   2) Assess for instability of facial bones.
   3) Assess for nasal, eye, and oral injuries.

   **Definitive Care:**
   1) Protect and maintain airway.
   2) Treat eye injuries per protocol.

c. **NECK**

   1) Assess for wounds, swelling, deformity, subcutaneous emphysema, tracheal deviation, and venous distention.
   2) Assess quality of carotid pulses.

   **Definitive Care:**
   1) Apply cervical collar and cervical immobilization device for any trauma < 24 hours from time of injury. Call medical command if the patient’s cervical spine has been cleared at an outside hospital.
   2) Control bleeding by direct pressure.
   3) Protect airway.
d. CHEST
   1) Assess chest wall for wounds, deformities, and symmetrical excursion.
   2) Auscultate breath sounds.
   3) Auscultate heart tones with regard to rate and quality.
   Definitive Care:
      1) Assist ventilation per airway protocol.

e. ABDOMEN
   1) Assess abdomen for contusions, wounds or eviscerated organs.
   2) Gently palpate abdomen to assess tenderness or rigidity.
   Definitive Care:
      1) Cover open wounds with dry sterile dressing.
      2) Cover any eviscerated organs with sterile moist saline dressing.

f. PERINEUM / PELVIS
   1) Assess for swelling, discoloration, bleeding or blood at urethral meatus.
   2) Gentle pressure to pelvis to assess stability and to detect crepitus.
   Definitive Care:
      1) Control bleeding by direct pressure.
      2) If pelvic fracture is suspected, bind pelvis using a pelvic sling (e.g. T-POD) to control potential bleeding.

g. EXTREMITIES
   1) Assess for bleeding, contusions, deformities, or swelling in all extremities.
   2) Assess neurovascular status of all extremities by noting presence of pulses, skin color and gross motor and sensory function.
   Definitive Care:
      1) Control bleeding by direct pressure and cover all open wounds with dry sterile dressings.
      2) Splint all suspected fractures and deformities. Assess peripheral neurovascular status after splinting.
      3) Place tourniquet if direct pressure and splinting fail to control bleeding.
      4) If a crush injury is suspected, contact medical command for additional NSS and/or NaHCO₃ (3 amps in one liter D₅W) at 200 mL/hr to prevent the effects of rhabdomyolysis.

h. NEUROLOGIC
   1) Assess mental status and note Glasgow Coma Scale score.
   2) Assess gross motor and sensory function. (If intubation and paralysis are required, report this assessment to the receiving facility).

History:
1) Obtain details surrounding incident.
2) Receive report of patient condition and interventions prior to flight crew arrival.
3) Obtain information concerning past medical history, allergies, medications and last meal.

**Definitive Care:**
1) Treat per Protocol CC611 (Head Injury).
2) Monitor and treat potentially reversible causes of altered level of consciousness (e.g., hypoxia, hypovolemia, hypoglycemia).

3. **RE-EVALUATION**
   a. Continually reassess patient for changes or new findings.
   b. Assess vital signs at least every 5 minutes.
   c. Monitor and document response to all interventions.
   d. Perform and document serial neurological, cardiac, respiratory and abdominal exams.

4. **ADDITIONAL TREATMENT**
   a. Ensure safety of crew and other scene personnel at all times.
   b. The most acute of the possibly applicable protocols takes precedence.
   c. Notify the receiving facility of patient's condition as soon as possible.
   d. Do not delay transport.
   e. Transport to trauma center as per state trauma destination protocols (if applicable).

**Performance Parameters:**

A. Appropriate application of Trauma destination policy.
B. IV/IO NSS treatment for hypotension.
C. Appropriate vital signs frequency.
D. IV/IO initiated en route vs. on scene.
E. Trauma notification.
F. Cervical spine immobilization.
G. Assessment of neurological status (GCS) prior to intubation or sedation and paralysis.
PAIN MANAGEMENT FOR TRAUMATIC INJURIES

Criteria:
  A. Patient with pain due to traumatic injury.

Exclusion Criteria:
  A. Patient with GCS <14. Consult Medical Command prior to pain management.
  B. Patient with SBP <100 mmHg. Consult Medical Command prior to pain management.

Procedure:
  1. Fentanyl (Sublimaze) 1 microgram/kg (maximum dose 100 micrograms) every 5 minutes until pain is controlled (pain described as 5/10 or less).
     a) Hold if SBP <100 mmHg.
     b) Maximum is up to 4 doses of Fentanyl.
  2. Re-evaluate Pain Scale with each vital sign assessment.

3. If pain continues, contact Medical Command for further orders.

Performance Parameters:
  A. Appropriate pain management.
  B. Appropriate Medical Command consultation.
  C. Documentation of Pain Scale with each vital sign assessment.
HEAD INJURY

Criteria:
A. Patient who meets either of the following criteria:
   1. Patient with a head injury and altered mental status (GCS <15).
   2. Patient with a CT-confirmed traumatic intracranial hemorrhage.

Exclusion Criteria:
A. Head injury, but alert and oriented with GCS = 15 and no known intracranial injury.

Procedure:
A. Refer to BLS Protocol #611 (Head Injury).
B. Additional/Preferred Procedures:
   1. If intubated, ventilate to maintain ETCO$_2$ 35-40 mmHg. Maintain O$_2$ Saturation >95%.
      a. Adult – SBP ≥ 100 mmHg.
      b. Pediatric: SBP ≥ 70 + (2 x age) mmHg.
      NOTE: Document GCS and pupil reactivity prior to any sedative or paralytic administration.
   4. Elevate head of bed 30 degrees (if spine is cleared).
   5. Signs/symptoms of imminent decompensation:
      a. Change in level of consciousness: GCS <10 or a decrease in GCS >2 points.
      b. Unequal pupils.
      c. Pupils become fixed.
      d. Decerebrate/decorticate posturing or unilateral deficit.
      e. Rising blood pressure with decreasing heart rate (Cushing’s reflex).
   Treatment:
      a. Re-perform primary survey (ABCs) and adjust minute ventilation to maintain ETCO$_2$ of 30-35 mmHg. **Intubate** if not already performed.
      b. Notify Medical Command.
   6. If a Phenytoin (Dilantin) infusion has been started by the referring facility for CT-confirmed intracranial hemorrhage, continue this infusion. Contact Medical Command based on the following parameters:
      a. Dosing range: **10-20 mg/kg** (maximum 2000 mg).
      b. Rate of infusion may not exceed 25 mg/min.
      c. If patient has HR <60, SBP <100 mmHg, or dysrhythmia, hold infusion and contact Medical Command.
   7. If patient has a CT-confirmed intracranial hemorrhage and an antiepileptic has not already been administered, contact Medical Command.
8. If patient has a CT-confirmed intracranial hemorrhage and patient is anticoagulated (e.g. takes Warfarin [Coumadin]) and/or has a coagulopathy with INR ≥1.5, contact Medical Command for possible administration of plasma if available.

9. If patient has a CT-confirmed intracranial hemorrhage and an antiepileptic has not already been administered, Medical Command may order **Phenytoin (Dilantin) 20 mg/kg IV** (maximum 2000 mg). Rate of infusion may not exceed 25 mg/min. If patient has HR <60, SBP <100 mmHg, or dysrhythmia, hold infusion and contact Medical Command.

10. If signs or symptoms of decompensation (change in mental status, unequal pupils, Cushing’s reflex defined as bradycardia and hypertension): contact Medical Command for **Mannitol 1 gm/kg IV** (Adult) or **0.5 gm/kg** (Pediatric) (maximum 50 gm) over 15 minutes.

11. If SBP greater than 220 mmHg, call Medical Command for potential hypertension control.

**Performance Parameters:**
A. Destination selection.
B. EtCO₂ monitoring.
C. Appropriate GCS/Pupils/Neuro exam before and after sedation.
D. Appropriate blood pressure control.
E. Appropriate seizure prophylaxis.
TRAIINA IN PREGNANCY

Criteria:
A. Patient meeting both of the following criteria:
   a. Significant head, trunk, and/or extremity trauma.
   b. Pregnancy greater than 20 weeks gestation.

Exclusion Criteria:
A. Pregnant patient less than 20 weeks gestation – Consult Medical Command for appropriate destination selection.

Procedure:
A. Refer to applicable BLS/ALS protocols:
   1. BLS 601 – Bleeding Control.
   2. BLS 602 – Multisystem Trauma or Traumatic Shock.
   3. BLS 632 – Impaled Object.
   4. ALS 6002 – Multisystem Trauma or Traumatic Shock.
B. Additional/Preferred Procedures:
   1. Attempt external fetal monitoring when possible.
   2. If SBP is $\leq 90$ mmHg, transport patient rolled slightly onto left side. Resuscitate as per Protocol CC705A-1 (Hypovolemic Shock).
   3. Cardiac arrest during transport: Continue resuscitation until arrival at trauma center.
   4. Transport to closest trauma center with emergency obstetrical services.

Note:
A. The preferred destination for pregnant trauma in the Pittsburgh Area is UPMC Mercy; the preferred site in the Maryland area is Maryland Shock Trauma.

Performance Parameters:
A. Proper use of all trauma protocols.
B. Transporting patient with hypotension on left side.
C. Cardiac arrest management.
D. Proper transport destination.
TENSION PNEUMOTHORAX

Criteria:
A. Patient meeting each of the following criteria:
   1. Known or suspected chest wall trauma, severe COPD, or airway manipulation.
   2. Decreased breath sounds (unilateral or bilateral).
   3. One of the following criteria:
      a. Difficulty ventilating (i.e., short of breath or elevated peak inspiratory pressures, increased resistance to bag-valve ventilation).
      b. Hypotension [Adult - SBP <90 mmHg; Pediatric - SBP ≤ 70 + (2 x age) mmHg].
      c. Subcutaneous emphysema of chest or neck.
      d. Jugular venous distention (JVD).
      e. Tracheal deviation.

Exclusion Criteria:
A. None.

Procedure:
1. Manage airway and administer oxygen as per Protocols CC202 (Oxygen Administration) and CC401 (Airway Management).
2. If patient is intubated, assess the ETT depth (3x internal tube size).
3. Needle decompress affected side at the fourth (4th) intercostal space, anterior axillary line (preferred). Alternative: 2nd intercostal space at mid-clavicular line. Use a 12-14G catheter (Adult) or 16-20G catheter (Pediatric).
4. Regardless of result, leave catheter (without needle) in place.
5. Recurrent symptoms/signs: Repeat procedure.

NOTE:
A. Once recognized or suspected, a tension pneumothorax should be treated promptly, without delaying to complete other tasks.

Performance Parameters:
A. Appropriate use of protocol.
B. Repeat procedure when indicated.
C. Appropriate resuscitation.
D. Destination selection.
AMPUTATION

Criteria:
A. Patient with amputation of a digit or limb.

Exclusion Criteria:
A. None.

Procedure:
A. Refer to BLS Protocol #662 (Amputation), including wrapping the amputated part(s) in sterile saline soaked gauze, seal in plastic and then place on ice.

B. Additional/Preferred Procedures:
1. Control hemorrhage: direct pressure, and/or proximal placement of BP cuff or CAT tourniquet for amputated or near amputated extremity.
2. Tourniquet use in partial or total amputation (NOTE – Do Not apply a tourniquet for amputation of digits).
   A. Use CAT tourniquet with caution in partial amputation of hands or feet. (Obtain Medical Command consult as needed for tourniquet use with these injuries).
   B. If unable to control hemorrhage via direct pressure or hemostatic dressings, apply CAT tourniquet proximal to, but as close as possible to, the site of bleeding.
   C. Turn windlass rod on CAT tourniquet until hemorrhage is controlled, and secure with Velcro tabs.
   D. Once secured, do not loosen the tourniquet windlass rod.
   E. Record time of application directly on the CAT tourniquet using a permanent marker or indelible ink.
   F. Report tourniquet use and time of placement to receiving facility trauma staff and confirm acknowledgement of presence of tourniquet application.
3. Incomplete amputation:
   A. Place injured limbs in a position of function, apply dry sterile dressing, and splint extremity(s).
   B. Elevate injured extremity; monitor neurovascular status.
5. Transport to a trauma facility per trauma destination policy. Consult for hand injuries, as some trauma centers may not have hand surgery.

6. Contact Medical Command for additional analgesia as needed.
7. When a patient is entrapped by a limb and cannot be extricated, and when requested by EMS, STAT MedEvac will attempt to arrange for a qualified physician to be transported to the scene. Contact STATCOM to consult with the Medical Director On-Call (MDOC).
Performance Parameters:

A. Appropriate care of amputated part documented.
B. Pain management.
C. Destination for isolated amputation.
BURNS

Criteria:
A. Patients with burns from:
   1. Thermal injury.
   2. Chemical dermal injury.
B. Patient with lightning or electrical injury.
C. Suspected inhalation injury:
   1. Facial Burns.
   2. Singed eyebrow or nasal hairs.
   3. Carbon deposits or acute inflammatory changes in the oropharynx.
   5. History of impaired mentation and/or confinement in a burning building.
   6. History of an explosion.
   7. Presence of erythema and edema in the airway.

Exclusion Criteria:
A. None.

Procedure:
A. Refer to applicable BLS/ALS protocols:
   1. BLS 671 – Burns.
   2. ALS 6071 – Burns.
B. Additional/Preferred Procedures:
   1. If SBP <100 mmHg, administer IV fluids to maintain SBP >100 mmHg.
   2. If SBP >100 mmHg and patient is less than 8 hours post burn, administer IV fluids at a rate
      equivalent to:
      a. Adults: % BSA burned x kg/4=ml/hr (for the first 8 hours post-burn).
      b. Peds: % BSA burned x kg/4=ml/hr + Maintenance fluids (for the first 8 hours post-
         burn).
      Maintenance Fluids:
      4 ml/kg/hr (first 10 kg) +
      2 ml/kg/hr (for 10-20 kg) +
      1 ml/kg/hr (for each kg over 20)
   3. If patient is greater than 8 hours post burn call command for fluid resuscitation.
   5. Obtain a lactate level. If lactate level is ≥4 mmol/L, contact Medical Command.
   6. If transport is >30 minutes, repeat lactate level in 30 minutes and contact Medical Command if
      lactate level is ≥4 mmol/L.
   7. Transport patient to appropriate Burn Center. If patient has non-burn traumatic injuries,
      contact Medical Command for appropriate destination.
8. Medical Command may order foley catheter placement (interfacility) to monitor urinary output.
   a. Fluid resuscitate to maintain urine output >30 mL/hr (Adult) or 1 mL/kg/hr (Pediatric).
   b. For Electrical Injuries: If urine myoglobin (red or brown urine) has been detected, 
      resuscitate with IV/IO fluid to initiate a diuresis.
      1) Medical Command may order Sodium Bicarbonate 200 mL/hr, and Mannitol 1 
         gm/kg (Adult) or 0.5 gm/kg (Pediatric) (maximum 50 gm) IV/IO over 15 minutes.
      2) If ECG changes consistent with hyperkalemia are present (peaked T waves or wide 
         complex rhythm), Medical Command may order 10% Calcium Gluconate 10 mL IV 
         (Adult only).

9. If the patient is intubated and circumferential chest burns limit chest wall excursion and the 
   ability to ventilate, perform chest wall escharotomy.

Performance Parameters:
   A. Destination selection.
   B. Proper fluid management.
   C. Pain management.
   D. Appropriate airway control for documentation of suspected inhalation injury.
   E. Appropriate monitoring.
   F. Appropriate consultation of Medical Command.

Burn Chart: Rule of Nine’s:
HYPOVOLEMIC SHOCK – ADULT

Criteria:
Patient meeting both Criteria A and Criteria B below:
A. Suspected fluid loss related to one of the following causes:
   1. Trauma.
   2. Suspected hemorrhage.
   3. Vomiting, diarrhea.
B. Decreased tissue perfusion as evidenced by any of the following:
   1. Systolic blood pressure <90 mmHg.
   2. Changes in mental status.
   3. Changes in skin color (pallor, mottling or cyanosis).
   4. Heart rate > 120 beats per minute.
   5. Capillary refill > 2 seconds.
   6. Urine output < 30 ml/hr for 4 hours or more (interfacility transports).
   7. Lactate level ≥4 mmol/L.
   8. Shock Index (HR/SBP) >0.9.

Exclusion Criteria:
A. None.

Procedure:
A. Refer to ALS Protocol #7005 (Shock / Systemic Inflammatory Response Syndrome).
B. Additional/Preferred Procedures:
   1. Control external blood loss.
   2. Consider obtaining secondary vascular access if not already established.
   3. Obtain a venous lactate level if not done so already. If systolic blood pressure is >90 mmHg and lactate level is ≥4 mmol/L, administer 500 mL NSS and contact Medical Command.
   4. If systolic blood pressure is <90 mmHg and not believed to be due to blood loss, fluid resuscitate with 2 Liters NSS under pressure to obtain a systolic blood pressure >90 mmHg.
   5. If systolic blood pressure is <90 mmHg and believed to be due to blood loss, fluid resuscitated with 1 L NSS wide open to obtain a systolic blood pressure >90 mmHg. If after one liter of crystalloid solution, patient's systolic blood pressure remains < 90 mmHg, and blood loss is suspected, transfuse 2 units of type "O" Packed Red Blood Cells (Rh negative preferred if female patient of child-bearing age) via large bore IVs (refer to Protocol CC212 – Administration of Blood).
   6. If transport is >30 minutes, repeat lactate level in 30 minutes and contact Medical Command if lactate level is ≥4 mmol/L.
   7. Bind pelvis with a sheet or commercial device if pelvic fracture is present or suspected as a source of hemorrhage.
8. If patient remains hypotensive after above interventions or after 30 minutes of treatment, contact Medical Command.

9. If patient remains hypotensive after 2 units of PRBCs, contact Medical Command for additional blood administration orders. Medical Command may order Fresh Frozen Plasma (FFP) if the patient is coagulopathic.

10. Medical Command may order **Levophed 0.05-0.5 micrograms/kg/min (50-500 nanograms/kg/min)** until systolic blood pressure is above 90 mmHg and there is improvement in tissue perfusion. Increase Norepinephrine (Levophed) by 0.05 micrograms/kg/min (50 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.5 micrograms/kg/min (500 nanograms/kg/min), recontact Medical Command.

**Note:**
A. For patients on interfacility transfers who are already receiving vasopressors listed above the medical consult line in this protocol, the medication may be continued based on the titration parameters listed above. For patients already receiving vasopressors listed below the medical consult line or absent from the protocol, contact Medical Command for continuation of the infusion or alternate therapy.

**Performance Parameters:**
A. Inclusion criteria for protocol.
B. Appropriate fluid resuscitation with normal saline.
C. Administration of correct type of blood if patient remains hypotensive after two liters of fluid.
D. Appropriate Medical Consultation.
DISTRIBUTIVE SHOCK – ADULT

Criteria:
Patient meeting both Criteria A and Criteria B below:
A. Evidence of shock related to one of the following causes:
   1. Sepsis (characterized by suspected infection in setting of shock).
   2. Anaphylaxis.
   3. Toxic drug exposure.
   5. Adrenal crisis.*
B. Decreased tissue perfusion as evidenced by any of the following:
   1. Systolic blood pressure <90 mmHg.
   2. Changes in mental status.
   3. Heart rate > 120 beats per minute.
   4. Urine output < 30 ml/hr for 4 hours or more (interfacility transports).
   5. Lactate level ≥4 mmol/L.

Note: Patients with distributive shock may have warm/pink skin and normal capillary refill.

Exclusion Criteria:
A. None.

Procedure:
A. Refer to ALS Protocol #7005 (Shock / Systemic Inflammatory Response Syndrome).
B. Additional/Preferred Procedures:
   1. Consider obtaining secondary vascular access if not already established.
   2. Obtain a venous lactate level if not done so already. If systolic blood pressure is >90 mmHg and lactate level is ≥4 mmol/L, administer 500 mL NSS and contact Medical Command.
   3. If systolic blood pressure is <90 mmHg, initiate 1 liter of NSS under pressure to obtain a systolic blood pressure >90 mmHg.
   4. If after 1 liter of crystalloid solution, patient's systolic blood pressure remains <90 mmHg, repeat 1 liter NSS bolus and initiate a vasopressor:
      a. If patient is already on a vasopressor other than Norepinephrine (Levophed), contact Medical Command regarding continuation and titration of the vasopressor, and/or need for additional vasopressor.
      b. If patient is not on a vasopressor, administer Norepinephrine (Levophed) 0.05-0.5 micrograms/kg/min (50-500 nanograms/kg/min) until systolic blood pressure is >90 mmHg and there is improvement in tissue perfusion. Increase Norepinephrine (Levophed) by 0.05 micrograms/kg/min (50 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.5 micrograms/kg/min (500 nanograms/kg/min), contact Medical Command.
5. If transport is >30 minutes, repeat lactate level in 30 minutes and contact Medical Command if lactate level is ≥4 mmol/L.

6. If patient remains hypotensive after above interventions or after 30 minutes of treatment, contact Medical Command.

7. If patient is acidic (pH <7.1), contact Medical Command. Medical Command may order Sodium Bicarbonate 1 mEq/kg IV.

8. Medical Command may order Vasopressin 0.04 units/min IV. Dose is not titrated. This may be particularly useful when patient is acidic (pH <7.1), as other vasopressors are ineffective in an acidic environment.

9. For patients with suspected spinal cord injury and persistent hypotension, Medical Command may order Phenylephrine HCl (Neosynephrine) 0.25-1.5 micrograms/kg/min; titrate in increments of 0.25 micrograms/kg/min every 5 minutes to maintain SBP >90 mmHg and MAP >65.

10. Medical Command may order Epinephrine 0.05-0.15 micrograms/kg/min (50 nanograms/kg/min). Titrate by 0.02 micrograms/kg/min (20 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.15 micrograms/kg/min (150 nanograms/kg/min), contact Medical Command.

11. If adrenal crisis is suspected, contact Medical Command. Medical Command may order Hydrocortisone (Solu-Cortef) 100 mg IV.

Note:
A. For patients on interfacility transfers who are already receiving vasopressors listed above the medical consult line in this protocol, the medication may be continued based on the titration parameters listed above. For patients already receiving vasopressors listed below the medical consult line or absent from the protocol, contact Medical Command for continuation of the infusion or alternate therapy.

Performance Parameters:
A. Inclusion criteria for protocol.
B. Appropriate fluid resuscitation with normal saline.
C. Appropriate use of vasopressors.
D. Appropriate Medical Consultation.
CARDIOGENIC SHOCK – ADULT

Criteria:

Patient meeting Criteria A and B below:

A. Decrease in cardiac output related to any of the following:
   1. Acute Myocardial Infarction.
   2. Pulmonary Edema/CHF.
   3. Congenital Heart Defects.

B. Decreased tissue perfusion as evidenced by any of the following:
   1. Systolic blood pressure <90 mmHg.
   2. Changes in mental status.
   3. Changes in skin color (pallor, mottling or cyanosis).
   4. Heart rate > 120 beats per minute.
   5. Capillary refill > 2 seconds.
   6. Urine output < 30 ml/hr for 4 hours or more (interfacility transports).
   7. Lactate level ≥ 4 mmol/L.

Exclusion Criteria:

A. None.

Procedure:

A. Refer to ALS Protocol #7005 (Shock / Systemic Inflammatory Response Syndrome).

B. Additional/Preferred Procedures:
   1. Consider obtaining secondary vascular access if not already established.
   2. Administer bolus of **250 ml NSS IV** if not already administered and contact Medical Command.
   3. Obtain a venous lactate level if not done so already. If lactate level is ≥4 mmol/L, contact Medical Command.
   4. If transport is >30 minutes, repeat lactate level in 30 minutes and contact Medical Command if lactate level is ≥4 mmol/L.

5. Medical Command may order Norepinephrine (**Levophed**) **0.05-0.5 micrograms/kg/min (50-500 nanograms/kg/min)** until systolic blood pressure is above 90 mmHg and there is improvement in tissue perfusion. Increase Norepinephrine (**Levophed**) by 0.05 micrograms/kg/min (50 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.5 micrograms/kg/min (500 nanograms/kg/min), recontact Medical Command.
6. Medical Command may order administration of **Dobutamine 5-20 micrograms/kg/min** to maintain systolic blood pressure >90 mmHg. Titrate by 5 micrograms/kg/min every 5 minutes to obtain goal SBP.

7. If no response to Levophed and Dobutamine, Medical Command may order **Epinephrine 0.05-0.15 micrograms/kg/min (50-150 nanograms/kg/min)**. Titrate by 0.02 micrograms/kg/min (20 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.15 micrograms/kg/min (150 nanograms/kg/min), recontact Medical Command.

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**Note:**

A. For patients already receiving vasopressors listed below the medical consult line or absent from the protocol, contact Medical Command for continuation of the infusion or alternate therapy.

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**Performance Parameters:**

A. Inclusion criteria for protocol.

B. Appropriate use of vasopressors to maintain blood pressure.

C. Documentation of frequent reassessment.
SHOCK – PEDIATRIC

Criteria:
A. Decreased tissue perfusion as evidenced by any of the following:
   1. Hypotension:
      a. <1 month SBP <60 mmHg
      b. 1 month - 1 year SBP <70 mmHg
      c. >1 year SBP <70 + (2 x age in yrs) mmHg
   2. Changes in mental status.
   3. Changes in skin color (pallor, mottling or cyanosis).
   4. Tachycardia/Bradycardia.
   5. Diminished peripheral pulses or capillary refill >2 seconds.

Exclusion Criteria:
B. None.

Procedure:
A. Refer to ALS Protocol #7005 (Shock / Systemic Inflammatory Response Syndrome).
B. Additional/Preferred Procedures:
   1. Check glucose.
   2. Check lactate level. If lactate level ≥4 mmol/L, contact Medical Command.
   3. If transport is >30 minutes, repeat lactate level in 30 minutes and contact Medical Command if lactate level is ≥4 mmol/L.
   4. HYPOVOLEMIC SHOCK (History of diarrhea, vomiting or blood loss).
      a. If patient has hypotension based on the parameters above:
         1) If liver is not palpable, administer NSS 20 ml/kg IV/IO boluses up to 60 ml/kg to raise SBP based on parameters above and improve tissue perfusion.
         2) If liver is palpable, contact Medical Command.
      b. If patient does not have hypotension and lactate level is ≥4 mmol/L, administer 20 ml/kg NSS and contact Medical Command.
      c. If patient has evidence of decreased tissue perfusion based on above criteria but lactate level is ≤4 mmol/L and patient is not hypotensive, contact Medical Command.
      d. If there is persistent shock after the administration of 60 ml/kg of crystalloid, Medical Command may order 10 ml/kg of PRBCs and to repeat X 2 or until signs of decreased tissue perfusion resolve.
      e. If the liver is palpable, Medical Command may order Epinephrine 0.05-0.15 micrograms/kg/min (50-150 nanograms/kg/min). Titrate by 0.02 micrograms/kg/min (20 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.15 micrograms/kg/min (150 nanograms/kg/min), contact Medical Command.
5. **DISTRIBUTIVE SHOCK: Sepsis** (History of fever and/or petechiae and no fluid loss), **Anaphylaxis**, **Toxic drug exposure**, **Spinal cord injury**, or **Adrenal crisis**.
   a. If patient has hypotension based on the parameters above:
      1) If liver is not palpable, administer **NSS 20 ml/kg IV/IO boluses up to 60 ml/kg to raise SBP based on parameters above and improve tissue perfusion**.
      2) If liver is palpable, contact Medical Command.
   b. If patient does not have hypotension and lactate level is ≥4 mmol/L, administer **20 ml/kg NSS** and contact Medical Command.
   c. If patient has evidence of decreased tissue perfusion based on above criteria but lactate level is ≤4 mmol/L and patient is not hypotensive, contact Medical Command.
   
   d. If there is persistent shock after the administration of 60 ml/kg of crystalloid and/or liver is palpable, Medical Command may order **Epinephrine 0.05-0.15 micrograms/kg/min (50-150 nanograms/kg/min)**. Titrate by 0.02 micrograms/kg/min (20 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.15 micrograms/kg/min (150 nanograms/kg/min), contact Medical Command.
   e. If adrenal crisis is suspected, contact Medical Command. Medical Command may order **Hydrocortisone (Solu-Cortef) 1 mg/kg IV** (maximum 100 mg).

6. **CARDIOGENIC SHOCK** (Bilateral rales, hepatomegaly, +/- heart murmur or history of heart disease).

   a. Contact Medical Command. Medical Command may order **Epinephrine 0.05-0.15 micrograms/kg/min (50-150 nanograms/kg/min)** to raise SBP based on parameters above. Titrate by 0.02 micrograms/kg/min (20 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.15 micrograms/kg/min (150 nanograms/kg/min), contact Medical Command.
   b. (Interfacility) Medical Command may order **Lasix 1 mg/kg IV**.
   c. (Interfacility) Medical Command may order **Alprostadil (Prostaglandin E-1) 0.05 micrograms/kg/min IV** for infants < 4 weeks of age with liver palpable.

**Note:**
A. Consult command regarding intubation of patients receiving PGE-1 as it may precipitate apnea.

**Performance Parameters:**
A. Inclusion criteria documented.
B. Appropriate arm of protocol used.
C. Proper fluid boluses for weight.
D. Epinephrine infusion/use and proper dose.
E. Appropriate Medical Command contact.
ISCHEMIC STROKE – ADULT

Criteria:
A. Interfacility transfer of patient diagnosed with acute ischemic stroke at referring hospital.

Exclusion Criteria:
A. Evidence of intracranial hemorrhage.
B. Evidence of trauma.

Procedure:
A. Refer to ALS Protocol #7006 (Stroke).
B. Additional/Preferred Procedures:
   1. Document neurologic findings, NIHSS (Refer to Appendix D), and onset of symptoms (GCS, Ability to follow commands, Pupillary, Motor, and Sensory response). NIHSS must be documented at the beginning and end of the transport.
   2. For patients who HAVE NOT received thrombolitics and are not expected to receive thrombolitics:
      1) If the \textit{SBP} >220 mmHg or the \textit{DBP} >110 mmHg and heart rate >60 beats/min:
         1) Administer \texttt{Labetalol 10 mg IV}.
         2) If BP is still greater than above parameters after 10 minutes, give \texttt{Labetalol 20 mg IV}.
         3) If BP is still greater than above parameters after 10 minutes, initiate \texttt{Nicardipine (Cardene) 5 mg/hr}. Titrerate by 2.5 mg/hr every 5 minutes to a goal of \textit{SBP} <220 mmHg and \textit{DBP} <110 mmHg (maximum 15mg/hr).
      2) If the \textit{SBP} >220 mmHg or the \textit{DBP} >110 mmHg and heart rate <60:
         1) Initiate \texttt{Nicardipine (Cardene) 5 mg/hr}. Titrerate by 2.5 mg/hr every 5 minutes to a goal of \textit{SBP} < 220 mmHg and \textit{DBP} < 110 mmHg (maximum 15mg/hr).
   3. For patients who HAVE received thrombolitics or are expected to receive thrombolitics:
      a. If the \textit{SBP} >185 mmHg or the \textit{DBP} >110 mmHg and heart rate >60 beats/min:
         1) Administer \texttt{Labetalol 10 mg IV}.
         2) If BP is still greater than above parameters after 10 minutes, give \texttt{Labetalol 20 mg IV}.
         3) If BP is still greater than above parameters after 10 minutes, initiate \texttt{Nicardipine (Cardene) 5 mg/hr}. Titrerate by 2.5 mg/hr every 5 minutes to a goal of \textit{SBP} <185 mmHg and \textit{DBP} <110 mmHg (maximum 15mg/hr).
      b. If the \textit{SBP} >185 mmHg or the \textit{DBP} >110 mmHg and heart rate <60:
         1) Initiate \texttt{Nicardipine (Cardene) 5 mg/hr}. Titrerate by 2.5 mg/hr every 5 minutes to a goal of \textit{SBP} < 185 mmHg and \textit{DBP} < 110 mmHg (maximum dose is 15mg/hr).
   4. If blood pressure drops precipitously, stop infusions, administer \texttt{250 ml NSS IV bolus}, and contact Medical Command.
5. Contact Medical Command for signs of decompensation (change in mental status, unequal pupils, Cushing’s reflex defined as bradycardia and hypertension), or if patient’s stroke symptoms worsen.

Performance Parameters:

A. Appropriate application of inclusion/exclusion criteria.
B. Use of appropriate blood pressure goal.
C. Appropriate blood pressure management with Labetalol and/or Nicardipine.
D. Documentation of NIHSS at the beginning and end of transport.
SEIZURE

Criteria:
A. Patients who are actively seizing with generalized clonic-tonic seizure. Indicators of seizures requiring treatment include:
1. Two or more consecutive seizures without return of consciousness between episodes.
2. Ongoing seizure for more than 4 minutes.
3. Seizures associated with hypoxia.
B. Patients who have had tonic-clonic seizure activity prior to EMS arrival.

Exclusion Criteria:
A. Patients who are postictal following a single seizure and have history or evidence of trauma - Follow Protocol #6002 (Multi-system Trauma or Traumatic Shock) or Protocol #611 (Head Injury), as indicated.

Procedure:
A. Refer to ALS Protocol #7007 (Seizure).
B. Additional/Preferred Procedures:
1. If seizure activity is persistent, administer Lorazepam (Ativan) 2 mg IV (adult) or 0.1 mg/kg IV (Pediatric, max 2mg per dose) every 2 minutes up to maximum of 6 mg (adult) or 3 doses (Pediatric).
2. If seizure activity is persistent, consider intubation.
   Note: Paralytic agents (e.g. Succinylcholine), if necessary, may be used to facilitate intubation. However, they do not treat/stop seizures. Continue to administer anticonvulsant medications! Medical Command must be contacted prior to the administration of Vecuronium.
   3. If serum Na⁺ is < 125 mEq/L: Contact Medical Command for possible administration of 3% Sodium Chloride solution from referring facility.
4. If seizure activity is persistent, or situation warrants, contact Medical Command. Medical Command may order Phenytoin (Dilantin) 20 mg/kg (maximum 2000 mg) IV; rate may not exceed 25 mg/min.
   NOTE: Hypotension may occur with intravenous Phenytoin administration; blood pressure and cardiac rhythm must be monitored closely. This risk may be diminished by administration at a lower rate. Discontinue Phenytoin if hypotension, bradycardia, or QRS widening occurs and contact Medical Command.
   5. If seizure activity is persistent, or situation warrants, Medical Command may order Phenobarbital 20 mg/kg IV (maximum 1000 mg) over 10 minutes.
   NOTE: Monitor closely for hypotension and respiratory depression.
Note:

A. For Pediatric patients, the preferred antiepileptic is:
   1. Age < 6 months: **Phenobarbital 20 mg/kg IV** (maximum 1000 mg).
   2. Age >6 months: **Phenytoin (Dilantin) 20 mg/kg IV** (maximum 2000 mg); rate may not exceed 25 mg/min.

Performance Parameters:

A. Checking serum glucose and treating hypoglycemia.
B. Appropriate administration of Ativan.
C. Vecuronium administration only with Medical Command consultation.
D. Appropriate dose and rate for Dilantin infusion.
E. Appropriate Medical Command Contact.
NON-TRAUMATIC INTRACRANIAL HEMORRHAGE – ADULT

Criteria:
A. Known intracranial hemorrhage related to hypertension and NO HISTORY OF TRAUMA.

Exclusion Criteria:
A. History of trauma related to this event.

Procedure:
A. Refer to ALS Protocol #7006 (Stroke).
B. Additional/Preferred Procedures:
   1. Ensure airway patency; administer high flow oxygen.
   2. Document neurologic findings (GCS, Ability to follow commands, Pupillary, Motor, and Sensory response).
   3. If systolic blood pressure is >140 mmHg and heart rate is >60:
      a. Administer Labetalol 10 mg IV. Target blood pressure is SBP <140 mmHg.
      b. If target blood pressure goal is not reached after 10 minutes and HR >60, administer Labetalol 20 mg IV (x 1).
      c. If target blood pressure goal is not achieved after administration of Labetalol, initiate Nicardipine (Cardene) 5 mg/hr. Titrate by 2.5 mg/hr every 5 minutes to meet target SBP <140 mmHg (maximum 15 mg/hr).
   4. If systolic blood pressure is >140 mmHg and heart rate is <60, initiate Nicardipine (Cardene) 5 mg/hr. Titrate by 2.5 mg/hr every 5 min to a goal systolic blood pressure <140 mmHg (maximum 15 mg/hr).
   5. Monitor closely; if blood pressure drops precipitously, discontinue infusion, administer 250 ml Normal Saline bolus and contact Medical Command.
   6. If a Phenytoin (Dilantin) infusion has been started by the referring facility for CT-confirmed intracerebral hemorrhage, continue this infusion. Contact Medical Command if infusion is outside of the following parameters:
      a. Dosing range: 10-20 mg/kg (maximum 2000 mg).
      b. Rate of infusion may not exceed 25 mg/min.
      c. If patient has HR <60, SBP <100 mmHg, or dysrhythmia, hold infusion and contact Medical Command.
   7. If patient has a CT-confirmed intracranial hemorrhage and an antiepileptic has not already been administered, contact Medical Command.
   8. If patient has a CT-confirmed intracranial hemorrhage and patient is anticoagulated (e.g. takes Warfarin [Coumadin]) and/or has a coagulopathy with INR ≥1.5, contact Medical Command for possible administration of plasma if available.
9. If patient has a CT-confirmed intracranial hemorrhage, Medical Command may order **Phenytoin (Dilantin) 20 mg/kg IV** (maximum 2000 mg); rate of infusion may not exceed 25 mg/min. If patient has HR <60, SBP <100 mmHg, or dysrhythmia, hold infusion and contact Medical Command.

10. Contact Medical Command if signs of decompensation develop (change in level of consciousness, Glasgow Coma Scale <10, unequal pupils, pupils fixed, posturing, or Cushing's reflex defined as bradycardia and hypertension). Medical Command may order **Mannitol 1 gm/kg IV** (maximum 50 gm) over 15 minutes.

**Performance Parameters:**

A. Intracranial hemorrhage and hypertension are not trauma-related.

B. Appropriate mean arterial pressure calculation.

C. Appropriate blood pressure parameters and dosage of Labetalol.

D. Initiation of Nicardipine infusion and appropriate dosage if required.
NAUSEA AND VOMITING

Criteria:
A. Patient complaining of nausea and/or vomiting and SBP >90 mmHg.

Exclusion Criteria:
A. None.

Procedure:
A. Refer to ALS Protocol #7010 (Nausea/Vomiting).
B. Additional/Preferred Procedures:
   1. Treat underlying and potentially contributing factors.
   2. Adult:
      a. Ondansetron (Zofran) 4 mg IV.
      b. If continued nausea/vomiting, repeat Ondansetron (Zofran) 4 mg IV.
      c. If continued nausea/vomiting or allergy to Ondansetron, administer Prochlorperazine (Compazine) 10 mg IV over 2 minutes. If patient experiences akathesia (restlessness and/or agitation) after receiving Prochlorperazine (Compazine), administer Diphenhydramine (Benadryl) 25 mg IV and consult Medical Command.
   3. Pediatric (>2 years old):
      a. Ondansetron (Zofran) 4 mg IV.
      b. If continued nausea/vomiting, repeat Ondansetron (Zofran) 4 mg IV.
   4. Pediatric (6 months - 2 years old):
      a. Ondansetron (Zofran) 2 mg IV.
      b. If continued nausea/vomiting, repeat Ondansetron (Zofran) 2 mg IV.
   5. Pediatric (<6 months old): Consult Medical Command.
   6. Document any adverse reaction including continued nausea, sedation, or agitation.
   7. If continued nausea or vomiting, contact medical command.

Performance Parameters:
A. Appropriate use of Zofran.
B. Appropriate use of Prochlorperazine.
C. Appropriate Medical Command consultation.
DIABETIC KETOACIDOSIS

Criteria:
A. Diagnosis of diabetic ketoacidosis at referring facility and serum glucose >250 mg/dl.

Exclusion Criteria:
A. Diagnosis of diabetic ketoacidosis and serum glucose < 250 mg/dl – Contact Medical Command.

Procedure:
1. Ensure airway patency; administer high flow oxygen.
2. Administer 1000 ml NSS IV (adult) or 10 ml/kg NSS IV (pediatric) over 1 hour if not already administered; continue IV fluid resuscitation at 250 ml/hr (adult) or maintenance fluids (pediatric).
3. Contact Medical Command for guidance on further fluid resuscitation.
4. Medical Command may order an additional 1000 ml NSS IV (adult) or 10 ml/kg NSS IV (pediatric).
5. Medical Command may order to initiate or continue Insulin therapy (obtain from referring facility). Usual dose: Insulin 0.1 units/kg/hr IV.
6. Insert NG tube as needed for nausea/vomiting/gastric decompression.
7. If patient is on a ventilator or requires intubation consult Medical Command and do not paralyze the patient.
8. Consider administration of Sodium Bicarbonate 1 mEq/kg IV if serum pH is known to be <7.1.

Note:
A. Caution with administration of rapid IV fluids in pediatric patients with diabetic ketoacidosis (greater than 20 ml/kg), as this may cause cerebral edema.

Performance Parameters:
A. Appropriate administration of IV fluids per protocol.
B. Initiation of appropriate Insulin therapy.
SUSPECTED INFECTION – ADULT

Criteria:
A. Diagnosis of infection or suspected infection at a referring facility (e.g. cellulitis, meningitis, pneumonia, and urinary tract infection).

Exclusion Criteria:
A. None

Procedure:
1. For patients with suspected sepsis and/or shock, refer to CC705A-2 (Distributive Shock – Adult).
2. If patient is receiving or has been ordered to immediately receive an antibiotic listed below at the referring facility:
   a. Verify and document that the medication has been ordered by a physician at the referring facility.
   b. Verify and document the ordered dose and rate of the medication. If the dose or rate is outside the parameters outlined below, contact Medical Command prior to the initiation or continuation of this medication.
   c. Verify that the patient does not have a known allergy to that medication or class of medications. If patient has an allergy to that medication or class of medications, contact Medical Command.
   d. If the above parameters are met, continue administration of the medication at the same dose and rate as ordered at the referring facility.
3. Monitor the patient for any signs of allergic reaction. These may include rash/hives, itching, difficulty breathing, wheezing, tongue/lip swelling, or hypotension. If signs of an allergic reaction occur, stop the medication and contact Medical Command. Follow the following protocols as needed:
   a. BLS Protocol #411 (Allergic Reaction/Anaphylaxis).
   b. ALS Protocol #4011 (Allergic Reaction).

4. Contact Medical Command if:
   a. Antibiotic administration at the referring facility is outside of the dosing parameters listed below.
   b. There is any concern about the medication order or administration.
### Notes:

A. List of antibiotics that may be administered without Medical Command contact based on above parameters.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Class</th>
<th>Dosing Range</th>
<th>Time of Infusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin (Omnipen)</td>
<td>Penicillins</td>
<td>1 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Ampicillin/Sulbactam (Unasyn)</td>
<td>Penicillins</td>
<td>1.5 – 3 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Azithromycin (Zithromax)</td>
<td>Macrolides</td>
<td>500 mg</td>
<td>60 min</td>
</tr>
<tr>
<td>Aztreonam (Azactam)</td>
<td>Other</td>
<td>0.5 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Cefazolin (Ancef)</td>
<td>Cephalosporins</td>
<td>0.25 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Cefepime (Maxipime)</td>
<td>Cephalosporins</td>
<td>0.5 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Cefotaxime (Claforan)</td>
<td>Cephalosporins</td>
<td>0.5 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Cefotetan (Cefotan)</td>
<td>Cephalosporins</td>
<td>0.5 – 3 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Cefoxitin (Mefoxin)</td>
<td>Cephalosporins</td>
<td>1 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Ceftazidime (Fortaz, Tazicef)</td>
<td>Cephalosporins</td>
<td>0.5 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Ceftriaxone (Rocephin)C</td>
<td>Cephalosporins</td>
<td>1 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
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<td>30 min</td>
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<td>Ciprofloxacin (Cipro)</td>
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<tr>
<td>Clindamycin (Cleocin)</td>
<td>Other</td>
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<td>30 min</td>
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<tr>
<td>Doxycycline (Vibramycin)</td>
<td>Tetracyclines</td>
<td>100 mg</td>
<td>60 min</td>
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<tr>
<td>Ertapenem (Invanz)</td>
<td>Carbapenems</td>
<td>1000 mg</td>
<td>30 min</td>
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<tr>
<td>Gentamycin (Garamycin)</td>
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<td>30 min</td>
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<tr>
<td>Levofloxacin (Levaquin)</td>
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<td>250 – 500 mg</td>
<td>60 min</td>
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<tr>
<td></td>
<td></td>
<td>750 mg</td>
<td>90 min</td>
</tr>
<tr>
<td>Linezolid (Zyvox)</td>
<td>Other</td>
<td>600 mg</td>
<td>60 min</td>
</tr>
<tr>
<td>Meropenem (Merrem)</td>
<td>Carbapenems</td>
<td>500 – 1000 mg</td>
<td>30 min</td>
</tr>
<tr>
<td>Metronidazole (Flagyl)</td>
<td>Other</td>
<td>250 – 750 mg</td>
<td>60 min</td>
</tr>
<tr>
<td>Moxifloxacin (Avelox)</td>
<td>Quinolones</td>
<td>400 mg</td>
<td>60 min</td>
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<tr>
<td>Nafcillin (Nafcil, Unipen)</td>
<td>Penicillins</td>
<td>0.5 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Oxacillin (Bactocill, Prostaphilin)</td>
<td>Penicillins</td>
<td>0.25 – 2 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Penicillin G Potassium/Sodium</td>
<td>Penicillins</td>
<td>2 – 4 million units</td>
<td>60 min</td>
</tr>
<tr>
<td>Piperacillin/Tazobactam (Zosyn)</td>
<td>Penicillins</td>
<td>3.375 – 4.5 gm</td>
<td>180 min</td>
</tr>
<tr>
<td>Ticarcillin/Clavulanate (Timentin)</td>
<td>Penicillins</td>
<td>3.375 – 4.5 gm</td>
<td>30 min</td>
</tr>
<tr>
<td>Tigecycline (Tygacil)</td>
<td>Other</td>
<td>50 – 100 mg</td>
<td>60 min</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>Aminoglycosides</td>
<td>1 – 7 mg/kg</td>
<td>30 min</td>
</tr>
<tr>
<td>Trimethoprim/Sulfamethoxasole (Bactrim, Septra)</td>
<td>Sulfonamides</td>
<td>10 – 20 mg/kg</td>
<td>60 min</td>
</tr>
<tr>
<td>Vancomycin Hydrochloride</td>
<td>Other</td>
<td>0.5 – 1 gm</td>
<td>60 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5 – 2 gm</td>
<td>120 min</td>
</tr>
</tbody>
</table>
B. If an antibiotic infusion is already running at a receiving facility, the rate of administration should be adjusted so that the total dose would be administered over the specified time of infusion in this protocol, unless ordered differently by Medical Command. For example, if patient is receiving Azithromycin (Zithromax) 500 mg IV and half of the dose has already been administered, the remaining 250 mg should be administered over 30 min.

C. IV Ceftriaxone (Rocephin) should not be mixed with IV calcium-containing solutions and/or administered via the same IV line as IV calcium-containing products.

Performance Parameters:

A. Appropriate Medical Command contact.

B. Assessment for allergic reaction from medication.
EMERGENCY CHILDBIRTH

Criteria:
A. Pregnancy with signs of imminent delivery including crowning, mother with urge for bowel movement, frequent contractions < every 2 minutes, or worsening of perineal discomfort.

Exclusion Criteria:
A. None.

Procedure:
A. Refer to BLS Protocol #781 (Emergency Childbirth).
B. Additional/Preferred Procedures:
   1. Initiate external fetal monitoring whenever possible.
   2. Assist normal delivery as per BLS Protocol #781 (Emergency Childbirth). Additionally:
      a. Instruct mother to push only during contractions.
      b. Upon delivery of the infant’s head, turn the head gently. Deliver the anterior shoulder with gentle downward traction. Lift up and deliver the posterior shoulder.
      c. Once the placenta is delivered, massage the fundus to control bleeding.
   3. Volume resuscitate to maintain maternal SBP ≥ 90 mmHg.
   4. If there is post-partum hemorrhage, Medical Command may order **Oxytocin 60 milliunits/min IV** after placenta delivers. If bleeding is uncontrolled, increase Oxytocin by 20 milliunits/min every 15 minutes up to maximum of 200 milliunits/min.
   5. If there is an abnormal presentation (e.g. breech, prolapsed cord): Contact Medical Command.
   6. **BREECH PRESENTATION**
      a. If possible, mother’s hips should be at edge of stretcher – baby’s body will “hang” below her perineum.
      b. Allow the buttocks and trunk to deliver with gentle support and guidance, turning its back “up” to the ceiling (i.e. face down).
      c. Once the baby’s “belly button” (cord insertion) is out, for frank breech gently flex the legs across the baby’s belly to bring them down. You may want to turn the baby slightly for each leg while doing this.
      d. Once the axillae (arm pits) are out, flex each arm across the baby’s chest to bring them out. Again, you may gently rotate the baby’s body while sweeping out each arm.
      e. Support the baby’s body while waiting for the head to deliver.
      f. The head delivers in a flexed position ("chin to chest") whether spontaneously or with our assistance. If head does not deliver within 3 minutes: insert your middle and index finger into the vagina; move along the baby’s face up to the baby’s nose; push the
vaginal wall away from the baby’s nose and mouth to create an airway until the baby delivers.

**DO NOT TRY TO PULL BABY OUT WITH EXCESSIVE FORCE.**

g. After delivery, refer to BLS Protocol #781 (Emergency Childbirth) and protocol above, continuing with postpartum care.

7. **PROLAPSED CORD**
   a. Immediately place mother in a knee-chest position; if this is not possible, position mother so her hips and buttocks are elevated, in Trendelenberg, if possible.
   b. Immediately insert a gloved hand into the vagina; gently push the baby’s head off the cord; maintain this position at all times during transport and until relieved at the receiving institution.

8. **LIMB PRESENTATION**
   a. Fetus presents with a leg or arm first: contact Medical Command and land at the closest hospital with emergency obstetrical facilities.

9. **NEONATAL DISTRESS**
   a. Warm, dry and stimulate neonate.
   b. Call command for additional resources.
      1) Neonatal Team.
      2) An additional aircraft with an isolette.
   a. Provide blow-by oxygen.
   b. If neonate remains cyanotic or HR is < 100 bpm, administer bag and mask ventilation and consider intubation.
   c. If HR is persistently < 60 bpm begin chest compressions.

Performance Parameters:
A. Use of Fetal Monitoring.
B. Documentation and management of Breech Presentation.
C. Documentation and management of Prolapsed Cord Presentation.
D. Documentation and management of Limb Presentation.
E. Documentation of APGAR Scores (APGAR Checklist is located in the OB kit).
F. Calling medical command for additional resources.
ABRUPTIO PLACENTA / PLACENTA PREVIA

Criteria:
A. Pregnancy greater than 20 weeks gestation and either of the following:
   1. Hemorrhaging with little or no pain (Placenta Previa).
   2. Continuous painful contraction(s) with or without bleeding (Abruptio Placenta).

Exclusion Criteria:
B. None.

Procedure:
1. Monitor maternal vital signs and fetal heart rate (FHR). Attempt external fetal monitoring when possible.
2. Two Large Bore IVs with NSS. If no IV access, consider IO.
3. Resuscitate: maintain SBP $> 90$ mmHg.
4. Do not pack vagina or perform vaginal or rectal exams.
5. Be prepared for precipitous delivery (keep OB/Delivery Kit with patient at all times).
6. Medical Command may order Oxytocin 60 milliunits/min IV after placenta delivers. Increase Oxytocin by 20 milliunits/min every 15 minutes up to maximum of 200 milliunits/min if bleeding is substantial. Use Oxytocin 40 units/1000L NSS if bleeding is not controlled (must obtain from referring facility).
7. If no IV access, give Oxytocin 10 units IM.
8. After placenta delivers, use abdominal uterine fundal massage to help uterus contract down and slow bleeding.
9. If bleeding is not controlled with these measures, contact Medical Command.
10. If SBP is $< 90$ mmHg, transport patient rolled slightly onto left side. Resuscitate as per Protocol CC705A-1 (Hypovolemic Shock).

Note:
A. Use of tocolysis for severe abruption placenta is absolutely contraindicated as delivery is the treatment of choice. For mild abruption, tocolysis may be appropriate and should be considered in consultation with the referring/receiving OB/GYN physician and medical command. Use of tocolysis for placenta previa is generally considered appropriate in the setting of prematurity.
Performance Parameters:

A. Documentation of Abruption or Placenta Previa.
B. Establishment of two large bore IVs.
C. Appropriate use of Oxytocin.
D. Medical Command consultation.
E. Appropriate use of tocolysis.
PREECLAMPSIA / ECLAMPSIA

Criteria:

A. **Preeclampsia** – Pregnancy greater than 20 weeks gestation and any of the following:
   1. Systolic blood pressure > 160 mmHg or diastolic blood pressure > 110 mmHg.
   2. Proteinuria.

B. **Eclampsia** -- Preeclampsia with seizure activity.

Exclusion Criteria:

A. Patient has existing known hypertension prior to pregnancy. Contact Medical Command for management of hypertension.

Procedure:

1. Ensure airway patency; administer high flow oxygen.
2. Monitor maternal vital signs, intake and output, and fetal heart rate (FHR). Attempt external fetal monitoring when possible.
3. IV NSS. Total IV rate not to exceed 125 ml/hr (unless excessive blood loss occurs).
4. If possible, place patient in left lateral position.
5. If blood pressure elevated to SBP >160 mmHg or DBP >110 mmHg on at least 2 recordings greater than 10 minutes in duration:
   a. If HR >60 beats per minute, administer **Labetalol 10 mg IV**. If after 10 minutes blood pressure remains higher than parameters and HR >60, administer **Labetalol 20 mg IV**. Do not decrease diastolic blood pressure below 85.
   b. If patient remains with SBP >160 mmHg or DBP >110 mmHg, or HR <60, give **Hydralazine 5 mg IV**.
   c. If blood pressure remains above SBP >160 mmHg or DBP >110 mmHg, consult for additional BP control.
6. Seizure Treatment and/or Prevention:
   a. If Magnesium Sulfate 2-4 gm/hr has been initiated by the receiving facility, continue at that rate. If outside of this dosing range, contact Medical Command.
   b. If patient has a seizure or has had a seizure within past 24 hours and has not received treatment with Magnesium Sulfate:
      1) Administer **Magnesium Sulfate 4 gm IV** over 5-10 minutes.
      2) Initiate **Magnesium Sulfate 2 gm/hr**.
      3) If seizure activity continues, administer **Lorazepam (Ativan) 2mg IV** and repeat every 5 minutes up to total of 6 mg if there is persistent seizure activity.

7. Contact Medical Command if any further seizure activity occurs.
Note:
A. If Magnesium Sulfate has been initiated, closely monitor the patient for:
   1. Decrease in respiratory rate.
   2. Decrease in deep tendon reflexes (DTR) – Assess and document DTRs every 30 minutes including before and after transport.
   3. Hypotension.
      If present, decrease Magnesium Sulfate by 1 gm/hr and contact Medical Command.

Performance Parameters:
A. Documentation of eclampsia or preeclampsia.
B. Appropriate use of Labetalol.
C. Use of Hydralazine as second agent.
D. Continuation or initiation of Magnesium.
E. Documentation of DTRs on all patients on Magnesium Sulfate.
F. Documentation and management of seizure activity.
PREMATURE LABOR

Criteria:
A. Progression of labor and fetal gestational age < 37 weeks.

Exclusion Criteria:
A. None.

Procedure:
1. Ensure airway patency; administer high flow oxygen.
3. IV NSS. Total IV rate not to exceed 150 mL/hr.
4. Monitor frequency and duration of contractions.
5. If possible, place patient in slight left lateral tilt position.
6. If tocolytic therapy needs to be initiated (patient not already receiving such therapy) and patient’s SBP >90 mmHg and HR > 60, Medical Command may order Nifedipine 20 mg PO.

Performance Parameters:
A. Documentation of frequency and duration of contractions.
B. Appropriate use of Magnesium Sulfate.
C. Appropriate Medical Command consultation.
D. Documentation of DTRs if Magnesium Sulfate is used.
COMBATIVENESS – ADULT

Criteria:
A. Patient meeting both of these criteria:
   1. Signs of agitation or combativeness that potentially pose a threat to patient and/or crew safety.
   2. Potential causes (e.g., hypotension, hypoxia, closed head injury, hypoglycemia) have been considered and appropriately treated.

Exclusion Criteria:
A. None.

Procedure:
A. Refer to applicable BLS/ALS protocols:
   1. BLS Protocol #801 (Agitated Behavior/Psychiatric Disorders).
   2. ALS Protocol #8001 (Agitated Behavior/Psychiatric Disorders).
B. Additional/Preferred Procedures:
   1. Ensure airway patency and administer high flow O₂, attempt verbal redirection.
   2. Establish IV access. IO access only after patient has been chemically restrained.
   3. Administer Haldol 5 mg IV/IM.
   4. Closely monitor cardiac monitor, respiratory rate and oxygen saturation. Monitor continuous end-tidal CO₂ using nasal capnography on any patient requiring chemical restraint. For values above 50 mmHg, assist ventilations and contact Medical Command. **BE PREPARED TO INTUBATE.**
   5. Monitor cardiac rhythm for prolonged QT interval or ventricular dysrhythmia. If present, contact Medical Command.
   6. If response is inadequate after 3-5 minutes: Administer Lorazepam (Ativan) 2mg IV/IM.
   7. If response is inadequate after 3-5 minutes: Repeat Haldol 5 mg IV/IM.
   8. If response is still inadequate after 3-5 minutes: Administer Lorazepam (Ativan) 2 mg IV/IM.
   9. If response is still inadequate after 3-5 minutes: repeat Lorazepam (Ativan) 2 mg IV/IM.
10. If response is still inadequate: chemically paralyze and intubate as per Protocol CC401 (Airway Management).

Notes:
A. If rapid tranquilization is needed, you may proceed initially with Haldol 5 mg IV/IM and Ativan 2 mg IV/IM.
B. If response is inadequate after initial dose of Haldol and Lorazepam (Ativan) and patient is a threat to his/her own safety or the crew’s safety, may proceed with intubation per Protocol CC401 (Airway Management).
Performance Parameters:

A. Proper treatment of causes for combativeness addressed.
B. Appropriate dosage of medications utilized.
C. Repeat dose of initial medications necessary.
D. Need for airway protocol.
E. Appropriate patient monitoring.
POISONING / TOXIC EXPOSURE

Criteria:
A. Known or suspected potentially toxic ingestion, inhalation or injection.

Exclusion Criteria:
A. None.

Procedure:
A. Refer to applicable BLS/ALS Protocols:
   1. BLS Protocol #831 (Poisoning/Toxic Exposure).
   2. ALS Protocol #8031 (Poisoning / Toxic Exposure).
   3. ALS Protocol #8081 (Cyanide Compound Exposure).
   4. ALS Protocol #8083 (Nerve Agent / Pesticide Exposure).
B. Additional/Preferred Procedures:
   1. Ensure airway patency; administer high flow oxygen.
   2. Fluid resuscitate to maintain SBP > 90 mmHg.
   3. Monitor closely for dysrhythmias. Review 12-lead EKG findings if available. Call Medical Command if QRS is greater than 0.12 seconds for possible administration of Sodium Bicarbonate 1mEq/kg IV.
   4. If suspected opiate overdose, administer Naloxone (Narcan) 0.8-2 mg IV/IM. Repeat in 5-10 minutes if partial response noted.
   5. If systolic blood pressure is <90 mmHg and unresponsive to fluid resuscitation (1000 ml), initiate Levophed (Norepinephrine) 0.05-0.5 micrograms/kg/min (50-500 nanograms/kg/min) and titrate to maintain systolic blood pressure ≥90 mmHg. Increase Norepinephrine (Levophed) by 0.05 micrograms/kg/min (50 nanograms/kg/min) every 10 minutes to achieve goal SBP. If goal not reached at 0.5 micrograms/kg/min (500 nanograms/kg/min), contact Medical Command.
   6. Check serum glucose level; if < 80 mg/dl. Administer D$_{50}$W 25 gm/50ml IV.

7. Consult Medical Command for specific therapy and for possible toxicologist consultation.
8. If intubation is required and patient has a known acidosis, consult Medical Command prior to administration of sedation and paralysis.
9. Medical Command may order specific antidotes (may need to obtain from referring facility):
   a. Acetaminophen – N-Acetylcysteine.
   b. Salicylates (Aspirin) – Sodium Bicarbonate and saline.
   c. Tricyclic antidepressants – Sodium Bicarbonate.
   d. Toxic Alcohols – Fomepizole.
   e. Opioids – Narcan.
g. Calcium channel blockers – Calcium Gluconate.
h. Carbon monoxide – High-flow oxygen.
i. Cyanide – Cyanocobalamin.

Performance Parameters:
A. Appropriate administration of Narcan.
B. Initiation of Norepinephrine infusion for hypotension.
C. Measurement of serum glucose.
HAZARDOUS MATERIALS EXPOSURE

Criteria:
A. Presence or exposure to known or suspected hazardous material.

Exclusion Criteria:
A. None.

Procedure:
A. Refer to applicable BLS/ALS protocols:
   1. BLS Protocol #831 (Poisoning/Toxic Exposure).
   2. ALS Protocol #8031 (Poisoning / Toxic Exposure).
   3. ALS Protocol #8081 (Cyanide Compound Exposure).
   4. ALS Protocol #8083 (Nerve Agent / Pesticide Exposure).
B. Additional/Preferred Procedures:
   1. If a hazardous material is suspected to be involved at a scene, verify that the nearest
      HAZMAT response team has been notified.
   2. The on-scene HAZMAT response team will be responsible for LZ safety. No landing is to
      be made until clearance is given. The pilot should then verify that the LZ is safe and that it
      is upwind, uphill and as far from the material as feasible.
   3. Follow the direction of the HAZMAT scene commander concerning staging area, personal
      protection and safety and patient decontamination.
   4. Advise the HAZMAT team regarding patient care issues.
   5. Follow HAZMAT scene commander instructions regarding when it is safe to approach the
      patient.
   6. The flight crew may defer care until after primary decontamination has occurred. The
      patient(s) must receive primary decontamination prior to transport. If any crewmember
      feels that the gross decontamination of the patient is insufficient, request the HAZMAT
      team to perform a technical decontamination or consider ground transport to a facility
      capable of decontamination.
   7. Contact command prior to transporting any potentially contaminated patient.
   8. Ensure airway patency and administer high flow O₂.
   9. Establish IV/IO access. Site must be decontaminated prior to access.
10. Assess for the localized effects of the hazardous material exposure:
    a. Dermal irritation and/or lesions.
    b. Mucosal membrane irritation.
11. If eye injury is present related to caustic agent or chemical: Irrigate eyes with NSS for
    duration of transport, beginning as soon as possible after exposure.
    Note: If caustic agent is particulate or reactive with water, **do not irrigate**; attempt to gently
    remove substance using gauze.
12. Assess for the systemic effects of the hazardous material exposure:
    a. Respiratory – Shortness of breath, wheezing, stridor.
b. CNS - alteration in level of consciousness, anxiety, combativeness, seizures.
c. Cardiac - tachycardia, dysrhythmia, hypotension, cardiopulmonary arrest.

13. Institute appropriate trauma and/or medical treatment protocol.
14. Obtain treatment guidelines for hazardous material exposures from the referring agency or Medical Command. Poison Control (412) 681-6669 may also be valuable resources.
15. Provide receiving facility with patient update and indicate any special needs as soon as possible.
16. Ventilate aircraft.
17. Monitor crew members, including pilots, closely for evidence of exposure. If the pilot exhibits signs or symptoms of exposure, the aircraft must land.
18. Treat crew exposure symptoms immediately.
19. Crew members are to be appropriately decontaminated and must be cleared to return to duty by ED attending physician.
20. Follow receiving facility's decontamination procedure, which should include, but is not limited to:
   a. Flush body with copious amounts of water for at least 15 minutes in decontamination shower.
   b. If radiation exposure has occurred or is suspected, Geiger counter readings should be obtained prior to leaving the treatment area.

Performance Parameters:
   A. Hazardous Material Incident recognized.
   B. Proper notifications for scene response.
   C. Decontamination of crew and patient.
MEDICAL COMMAND CONTACT

Procedure:
A. Refer to applicable BLS/ALS protocols:
   1. BLS Protocol #901 (Medical Command Contact).
   2. ALS Protocol #9001 (Medical Command Contact).
B. Additional/Preferred Procedures:
   1. Medical Consultations should adhere to the structure outlined below (Medical Command Consultation Template).
   2. Consultation with a Medical Command physician should occur as outlined in the relevant protocols. Additionally, if the patient has persistent abnormal vital signs after initial interventions or if there is any concern regarding the appropriateness of any specific protocolized interventions, Medical Command should be consulted.
   3. If the medical provider(s) has(ve) a concern regarding a medical consultation provided by a Medical Command physician:
      a. Explain the concern to the medical command physician and request clarification regarding any orders being sought or provided.
      b. If there continues to be a concern by the medical crew provider(s), contact the Medical Director on Call (MDOC).

MEDICAL COMMAND CONSULTATION TEMPLATE

- Provider name, Base
- Referring and Receiving facilities (state if ground mission)
- Clinical Questions (purpose of the consult)
- Age, sex, chief complaint/diagnosis
- Pertinent HPI, PMH
- Pertinent treatment already received
- Vital signs (including Weight, Glucose, and Pain Scale if applicable)
- Pertinent physical exam findings
- Pertinent labs (if applicable)
- Restate Clinical Questions above
- Receive orders (Command Physician)
- Restate/verify orders
<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>MIXTURE</th>
<th>FLUID</th>
<th>CONCENTRATION</th>
<th>USUAL DOSING RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amiodarone</td>
<td>150 mg / 250 ml (self mix)</td>
<td>D5W</td>
<td>0.6 mg/ml</td>
<td>0.5-1 mg/min</td>
</tr>
<tr>
<td></td>
<td>450 mg / 250 ml (interfacility)</td>
<td></td>
<td>1.8 mg/ml</td>
<td></td>
</tr>
<tr>
<td>Diltiazem (Cardizem) c</td>
<td>125 mg / 125 ml</td>
<td>NSS, D5W</td>
<td>1 mg/ml</td>
<td>5-15 mg/hr</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>500 mg / 250 ml</td>
<td>D5W, NSS</td>
<td>2000 micrograms/ml</td>
<td>5-20 micrograms/kg/min</td>
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<tr>
<td>Dopamine</td>
<td>400 mg / 250 ml</td>
<td>D5W, NSS</td>
<td>1600 micrograms/ml</td>
<td>5-20 micrograms/kg/min</td>
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<td>Epinephrine</td>
<td>1 mg / 250 ml</td>
<td>NSS, D5W</td>
<td>4 micrograms/ml</td>
<td>0.05-0.15 micrograms/kg/min (50-150 nanograms/kg/min)</td>
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<tr>
<td>Eptifibatide (Integrilin) c</td>
<td>75 mg / 100 ml</td>
<td>NSS, D5W</td>
<td>0.75 mg/ml</td>
<td>1.2 micrograms/kg/min</td>
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<tr>
<td>Esmolol (Brevibloc) c</td>
<td>2,500 mg / 250 ml</td>
<td>NSS, D5W</td>
<td>10 mg/ml</td>
<td>50-300 micrograms/kg/min</td>
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<tr>
<td>Fentanyl c</td>
<td>2,500 micrograms / 100 ml</td>
<td>NSS, D5W</td>
<td>25 micrograms/ml</td>
<td>25-200 micrograms/hr</td>
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<tr>
<td>Heparin c</td>
<td>25,000 units / 250 ml</td>
<td>D5W, NSS</td>
<td>100 units/ml</td>
<td>100-2000 units/hr</td>
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<tr>
<td>Insulin (Regular) c</td>
<td>250 units / 250 ml</td>
<td>NSS, D5W</td>
<td>1 unit/ml</td>
<td>0.1 units/kg/hr</td>
</tr>
<tr>
<td>Labetalol (Trandate) c</td>
<td>300 mg / 80 ml</td>
<td>NSS, D5W</td>
<td>3.75 mg/ml</td>
<td>0.5-2 mg/min</td>
</tr>
<tr>
<td>Lidocaine (Xylocaine) c</td>
<td>2 gm / 250 ml</td>
<td>D5W, NSS</td>
<td>8 mg/ml</td>
<td>1-4 mg/min</td>
</tr>
<tr>
<td>Magnesium Sulfate c</td>
<td>40 gm / 1000 mL</td>
<td>D5W, NSS</td>
<td>40 mg/ml</td>
<td>2-4 gm/hr</td>
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<tr>
<td>Midazolam (Versed) c</td>
<td>100 mg / 100 ml</td>
<td>NSS, D5W</td>
<td>1 mg/ml</td>
<td>1-20 mg/hr</td>
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<tr>
<td>Milrinone (Primacor) c</td>
<td>20 mg / 100 ml</td>
<td>D5W</td>
<td>200 micrograms/ml</td>
<td>0.2-0.75 micrograms/kg/min</td>
</tr>
<tr>
<td>Nicardipine</td>
<td>20 mg / 200 ml</td>
<td>NSS, D5W</td>
<td>0.1 mg/ml</td>
<td>5-15 mg/hr</td>
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<tr>
<td>Nitroglycerin</td>
<td>25 mg / 250 ml</td>
<td>D5W</td>
<td>0.1 mg/ml</td>
<td>10-200 micrograms/min</td>
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<td>Nitroprusside (Nipride) c</td>
<td>50 mg / 250 ml</td>
<td>D5W</td>
<td>0.2 mg/ml</td>
<td>0.1-10 micrograms/kg/min</td>
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<tr>
<td>Norepinephrine (Levophed) c</td>
<td>8 mg / 250 ml</td>
<td>NSS, D5W</td>
<td>32 micrograms/ml</td>
<td>0.05-0.5 micrograms/kg/min (50-500 nanograms/kg/min)</td>
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<tr>
<td>Octreotide (Sandostatin) c</td>
<td>500 micrograms / 100 ml</td>
<td>NSS</td>
<td>5 micrograms/ml</td>
<td>25-50 micrograms/hr</td>
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</tbody>
</table>
### MEDICATION MIXTURE FLUID\(^b\) CONCENTRATION USUAL DOSING RANGE\(^c\)

<table>
<thead>
<tr>
<th>MEDICATION</th>
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<th>FLUID(^b)</th>
<th>CONCENTRATION</th>
<th>USUAL DOSING RANGE(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenylephrine (Neosynephrine)</td>
<td>10 mg / 250 ml NSS</td>
<td>40 micrograms/ml</td>
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<tr>
<td>Phenylephrine (Neosynephrine)</td>
<td>10 mg / 250 ml NSS</td>
<td>40 micrograms/ml</td>
<td>0.25-1.5 micrograms/kg/min</td>
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</tr>
<tr>
<td>Phenylephrine (Neosynephrine)</td>
<td>2000 mg / 250 ml NSS</td>
<td>8 mg/ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phenytoin (Dilantin)</td>
<td>1000 mg / 250 ml NSS</td>
<td>4 mg/ml</td>
<td>10-20 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Phenytoin (Dilantin)</td>
<td>2000 mg / 250 ml NSS</td>
<td>8 mg/ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procainamide (Pronestyl)(^c)</td>
<td>2 gm / 250 ml NSS</td>
<td>8 mg/ml</td>
<td>1-4 mg/min</td>
<td></td>
</tr>
<tr>
<td>Propofol (Diprivan)(^c)</td>
<td>1000 mg / 100 ml Premix</td>
<td>10 mg/ml</td>
<td>10-50 micrograms/kg/min</td>
<td></td>
</tr>
<tr>
<td>Sodium Bicarbonate(^c)</td>
<td>150 mEq / 1000 ml NSS</td>
<td>150 mEq/L</td>
<td>75-300 ml/hour</td>
<td></td>
</tr>
<tr>
<td>Vasopressin (Pitressin)</td>
<td>40 units / 250 ml NSS, D5W</td>
<td>0.16 units/ml</td>
<td>0.04 units/min (15 ml/hr)(^D)</td>
<td></td>
</tr>
<tr>
<td>Vecuronium(^c)</td>
<td>100 mg / 100 ml NSS, D5W</td>
<td>1 mg/ml</td>
<td>1-5 mg/hr</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

A. **This Standard Infusion List is only a reference of usual dosing ranges for verification of orders. Administration of any medication requires a standing order within a separate protocol or a Medical Command order.** Refer to the applicable protocol or online Medical Command order for dosing to be administered to the patient. Concentrations of medications may differ when obtained from a referring hospital. Contact Medical Command if there is any concern about the concentration or dosing of an infusion.

B. Fluid diluents that are compatible with each medication are provided. The first diluent listed is preferred.

C. These medications must be obtained from the referring facility for infusion. Concentrations may differ based on referring pharmacy – **Always check medications/concentrations provided.**

D. Vasopressin may be entered using the “generic drug” mode on the minimed pump at 15 ml/hr, as long as the concentration is 0.16 units/ml. Ensure the correct concentration of drug is provided or adjust dosing accordingly. Contact Medical Command if there is any concern regarding dosing.

E. Epinephrine or Norepinephrine (Levophed) dose may exceed the above dosing range if under order from Medical Command. However, if a high dose is ineffective, consider possibility of metabolic acidosis, which makes catecholamines such as Epinephrine and Norepinephrine ineffective. Consult Medical Command for treatment of the metabolic acidosis and/or use of Vasopressin (which is not pH-dependent) in these cases.

F. Example infusion calculation (use pump’s drug calculator whenever possible):

1. Order: Dopamine 5 micrograms/kg/min for a 70 kg patient and 400 mg / 250 ml NSS.
2. Dose Calculation: Dopamine (5 micrograms/kg/min) x (70 kg) = 350 micrograms/min.
3. Volume Calculation: (350 micrograms/min) x (250 ml / 400,000 micrograms) = 0.22 ml/min.
HYPOXIA CHECKLIST

Desaturation of Patient on Mechanical Ventilation

1. Check vital signs to r/o hemodynamic compromise.
2. Check $O_2$ source and connection.
3. Increase $F_iO_2$ to 100% $O_2$. Does hypoxia improve?
4. Look at the ventilator for alarms, if no alarms (other than PIP):

Check Peak Inspiratory Pressure

High (> 45 mmHg)  Normal/Low (≤45 mmHg)

**Problem:** Tidal volume is having trouble getting in. This may be secondary to:

1. **Circuit obstruction**
   - Examine vent circuit
2. **ET Tube obstruction**
   - Patient biting / tube kinking
   - Sedate and paralyze patient
3. **Secretions**
   - Suction patient
4. **Pt asynchronous w/ vent**
   - Sedate and paralyze pt
5. **Ventilator malfunction**
   - Recheck for alarms
6. **Check for Auto-PEEP**
   - Disconnect from vent for 10 secs
7. **Tension Pneumothorax**
   - Examine pt for subQ air
   - Suspicion based on hx
   - Needle decompression
8. **Remove pt from vent**
   - Bag pt with 100% $O_2$
9. **Contact Medical Command**

**Problem:** Mechanics of oxygen exchange. Possible causes are:

1. **Circuit disconnect / leak**
   - Examine vent circuit
2. **ET tube dislodged**
   - Check ETCO2 waveform
   - Check tube depth
3. **Check pilot balloon**
   - Check for cuff leak/deflated
   - Inflate ET cuff
4. **Pulse ox malfunction**
   - Check on self
5. **Ventilator malfunction**
   - Recheck for alarms
6. **Remove pt from vent**
   - Bag pt with 100% $O_2$
7. **Contact Medical Command**
LTV QUICK REFERENCE

ASSIST / VOLUME CONTROL

1. Press the SELECT (AC/SIMV) button until ASSIST/CONTROL is selected.
2. Press the SELECT (Volume/Pressure) button until VOLUME is selected.
3. Set the BREATH RATE per protocol or Medical Command order.
4. Set the TIDAL VOLUME per protocol or Medical Command order.
5. Set the INSPIRATORY TIME based on the rate of ventilations:
   a. Rate 10  Inspiratory Time 2.0
   b. Rate 12  Inspiratory Time 1.6
   c. Rate 14  Inspiratory Time 1.4
   d. Rate 16  Inspiratory Time 1.2
   e. Rate 18  Inspiratory Time 1.1
   f. Rate 20  Inspiratory Time 1.0
6. Set the FIO₂ per protocol or Medical Command order.
7. Set the Alarm Limits:
   a. Set the LOW PRESSURE ALARM LIMIT to 5 cm H₂O.
   b. Set the HIGH PRESSURE ALARM LIMIT:
      1) For patient with Endotracheal Intubation: Set to 45 cm H₂O.
      2) For patient with a King Airway: Set to 30 cm H₂O.
8. Set the PEEP per protocol or Medical Command order.
   a. LTV 1200 – Set PEEP on the ventilator.
   b. LTV 1000 – Set PEEP on the exhalation valve.

PRESSURE CONTROL

1. Press the SELECT (AC/SIMV) button until ASSIST/CONTROL is selected.
2. Press the SELECT (Volume/Pressure) button until PRESSURE is selected.
3. Set the BREATH RATE per protocol or Medical Command order.
4. Set the PRESSURE CONTROL per protocol or Medical Command order.
5. Set the INSPIRATORY TIME based on the rate of ventilations:
   a. Rate 10  Inspiratory Time 2.0
   b. Rate 12  Inspiratory Time 1.6
   c. Rate 14  Inspiratory Time 1.4
   d. Rate 16  Inspiratory Time 1.2
   e. Rate 18  Inspiratory Time 1.1
   f. Rate 20  Inspiratory Time 1.0
5. Set the FIO₂ per protocol or Medical Command order.
6. Set the LOW PRESSURE ALARM LIMIT to 5 cm H₂O.
7. Set the PEEP per protocol or Medical Command order.
   a. LTV 1200 – Set PEEP on the ventilator.
   b. LTV 1000 – Set PEEP on the exhalation valve.
SIMV (VOLUME)
1. Press the **SELECT (AC/SIMV)** button until **SIMV** is selected.
2. Press the **SELECT (Volume/Pressure)** button until **VOLUME** is selected.
3. Set the **BREATH RATE** per protocol or Medical Command order.
4. Set the **TIDAL VOLUME** per protocol or Medical Command order.
5. Set the **INSPIRATORY TIME** based on the rate of ventilations:
   a. Rate 10 Inspiratory Time 2.0
   b. Rate 12 Inspiratory Time 1.6
   c. Rate 14 Inspiratory Time 1.4
   d. Rate 16 Inspiratory Time 1.2
   e. Rate 18 Inspiratory Time 1.1
   f. Rate 20 Inspiratory Time 1.0
6. Set the **PRESSURE SUPPORT** per protocol or Medical Command order.
7. Set the **FIO₂** per protocol or Medical Command order.
8. Set the Alarm Limits:
   a. Set the **LOW PRESSURE ALARM LIMIT** to 5 cm H₂O.
   b. Set the **HIGH PRESSURE ALARM LIMIT**:
      1) For patient with Endotracheal Intubation: Set to 45 cm H₂O.
      2) For patient with a King Airway: Set to 30 cm H₂O.
9. Set the **PEEP** per protocol or Medical Command order.
   a. LTV 1200 – Set PEEP on the ventilator.
   b. LTV 1000 – Set PEEP on the exhalation valve.

NON INVASIVE POSITIVE PRESSURE VENTILATION (NPPV / BiPAP)
1. Press the **SELECT (AC/SIMV)** button until **SIMV** is selected
2. Press the **SELECT (Volume/Pressure)** button until **PRESSURE** is selected.
3. Set the **BREATH RATE** to **OFF** or (--).
4. Set the **INSPIRATORY TIME** for the apnea backup based on the rate of ventilations:
   a. Rate 10 Inspiratory Time 2.0
   b. Rate 12 Inspiratory Time 1.6
   c. Rate 14 Inspiratory Time 1.4
   d. Rate 16 Inspiratory Time 1.2
   e. Rate 18 Inspiratory Time 1.1
   f. Rate 20 Inspiratory Time 1.0
5. Set the **PRESSURE SUPPORT** per Medical Command order. If transferring settings from a different ventilator for a patient already on NPPV, settings are typically:
   a. LTV 1200 – PRESSURE SUPPORT = Inspiratory Pressure
   b. LTV 1000 – PRESSURE SUPPORT = Inspiratory Pressure + PEEP
6. Set the **PRESSURE CONTROL** to the same value as PRESSURE SUPPORT.
7. Set the **FIO₂** per Medical Command order.
8. Set the **HIGH PRESSURE ALARM LIMIT** to 40 cm H₂O.
9. Set the **PEEP** per Medical Command order. If transferring settings from a different ventilator for a patient already on NPPV, this is equal to the Expiratory Pressure.
   a. LTV 1200 – Set PEEP on the ventilator.
   b. LTV 1000 – Set PEEP on the exhalation valve.
10. Activate NPPV mode:
   a. Hold down the MONITOR SELECT button for 3 seconds.
   b. Turn the SET VALUE knob until VENT OP is displayed. Press the MONITOR SELECT button.
   c. Turn the SET VALUE knob until NPPV MODE is displayed. Press the MONITOR SELECT button.
   d. Turn the SET VALUE knob until NPPV ON is displayed. Press the MONITOR SELECT button.
   e. The NPPV LED will come on.
   f. Press CONTROL LOCK twice to exit menu.

PEDIATRIC VOLUMES (between 50-300ml)
   1. Enter the settings as above.
   2. To Set the Tidal Volume decrease the INSPIRATORY TIME to 0.3 sec.
   3. Set TIDAL VOLUME (LTV cannot be set to less than 50ml).

LTV 1000 SCHEMATIC:
### NIH STROKE SCALE

#### INSTRUCTIONS

**1. A) Level of Consciousness**

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alert: keenly responsive.</td>
</tr>
<tr>
<td>1</td>
<td>Not alert; but arousable by minor stimulation</td>
</tr>
<tr>
<td>2</td>
<td>Not alert; requires repeated stimulation to attend, or requires strong or painful stimulation to make movements.</td>
</tr>
<tr>
<td>3</td>
<td>Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, and areflexic</td>
</tr>
</tbody>
</table>

**B) LOC Questions**

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Answers both questions correctly.</td>
</tr>
<tr>
<td>1</td>
<td>Answers one question correctly.</td>
</tr>
<tr>
<td>2</td>
<td>Answers neither question correctly.</td>
</tr>
</tbody>
</table>

**C) LOC Commands**

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Performs both tasks correctly.</td>
</tr>
<tr>
<td>1</td>
<td>Performs one task correctly.</td>
</tr>
<tr>
<td>2</td>
<td>Performs neither task correctly.</td>
</tr>
</tbody>
</table>

#### 2. Best Gaze

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal.</td>
</tr>
<tr>
<td>1</td>
<td>Partial gaze palsy</td>
</tr>
<tr>
<td>2</td>
<td>Forced deviation</td>
</tr>
</tbody>
</table>

#### 3. Visual

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No visual loss.</td>
</tr>
<tr>
<td>1</td>
<td>Partial hemianopia.</td>
</tr>
<tr>
<td>2</td>
<td>Complete hemianopia.</td>
</tr>
<tr>
<td>3</td>
<td>Bilateral hemianopia (blind)</td>
</tr>
</tbody>
</table>

#### 4. Facial Palsy

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal symmetrical movements.</td>
</tr>
<tr>
<td>1</td>
<td>Minor paralysis</td>
</tr>
<tr>
<td>2</td>
<td>Partial paralysis.</td>
</tr>
<tr>
<td>3</td>
<td>Complete paralysis of one or both sides.</td>
</tr>
</tbody>
</table>

#### 5. A) Motor Arm - Left

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No drift for full 10 seconds</td>
</tr>
<tr>
<td>1</td>
<td>Drift</td>
</tr>
<tr>
<td>2</td>
<td>Some effort against gravity</td>
</tr>
<tr>
<td>3</td>
<td>No movement</td>
</tr>
</tbody>
</table>

**B) Motor Arm - Right**

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No drift for full 10 seconds</td>
</tr>
<tr>
<td>1</td>
<td>Drift</td>
</tr>
<tr>
<td>2</td>
<td>Some effort against gravity</td>
</tr>
<tr>
<td>3</td>
<td>No movement</td>
</tr>
</tbody>
</table>

#### 6. A) Motor Leg - Left

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No drift for full 10 seconds</td>
</tr>
<tr>
<td>1</td>
<td>Drift</td>
</tr>
<tr>
<td>2</td>
<td>Some effort against gravity</td>
</tr>
<tr>
<td>3</td>
<td>No movement</td>
</tr>
</tbody>
</table>

**B) Motor Leg - Right**

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No drift for full 10 seconds</td>
</tr>
<tr>
<td>1</td>
<td>Drift</td>
</tr>
<tr>
<td>2</td>
<td>Some effort against gravity</td>
</tr>
<tr>
<td>3</td>
<td>No movement</td>
</tr>
</tbody>
</table>

**UN = Amputation or joint fusion**

#### 7. Limb Ataxia

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Absent.</td>
</tr>
<tr>
<td>1</td>
<td>Present in one limb.</td>
</tr>
<tr>
<td>2</td>
<td>Present in two limbs.</td>
</tr>
</tbody>
</table>

**UN = Amputation or joint fusion**

#### 8. Sensory

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal; no sensory loss.</td>
</tr>
<tr>
<td>1</td>
<td>Mild-to-moderate sensory loss.</td>
</tr>
<tr>
<td>2</td>
<td>Severe to total sensory loss.</td>
</tr>
</tbody>
</table>

#### 9. Best Language

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No aphasia; normal.</td>
</tr>
<tr>
<td>1</td>
<td>Mild-to-moderate aphasia.</td>
</tr>
<tr>
<td>2</td>
<td>Severe aphasia.</td>
</tr>
<tr>
<td>3</td>
<td>Mute, global aphasia.</td>
</tr>
</tbody>
</table>

#### 10. Dysarthria

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal.</td>
</tr>
<tr>
<td>1</td>
<td>Mild-to-moderate dysarthria.</td>
</tr>
<tr>
<td>2</td>
<td>Severe dysarthria.</td>
</tr>
</tbody>
</table>

**UN = Intubated or other physical barrier**

#### 11. Extinction and Inattention

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No abnormality.</td>
</tr>
<tr>
<td>1</td>
<td>Inattention or extinction to bilateral simultaneous stimulation in one sensory modality (visual, tactile, auditory, etc).</td>
</tr>
<tr>
<td>2</td>
<td>Profound hemi-inattention or extinction (&gt;1 modality).</td>
</tr>
</tbody>
</table>
INTRA-AORTIC BALLOON PUMP (IABP) REFERENCE

Transfer of IABP

**Do not remove or turn off referral IABP until IABP transfer is complete.**

1. **Assess the Patient** for:
   a. IABP insertion site, catheter size and type.
   b. Assess IABP settings.
   c. Assess platelet count, PTT, and INR.
   d. Assess IABP augmentation prior to arrival.
   e. Verify left radial and/or brachial pulses, urine output, and pedal pulses.
   f. Confirm IABP settings with referring staff.

2. **Power up IABP** (connect to AC power source). **Verify Adequate Helium Supply. Verify Autopilot/Operator Mode.**

3. **Apply Electrodes** (do not remove/disconnect existing electrodes).

4. **Connect A-Line & Cables** (level & secure to mid-axillary line).

5. If available, connect **Fiber Optic Sensor and Key Card** (upper left corner of display, light bulb icon color).
   b. Blue: Not zeroed (must be calibrated). Refer to “Calibrating Fiber Optic Catheter” below.

6. **Connect Helium Drive Line.**

7. **Verify Balloon Volume** (select “Apply” after change is made)

8. **Datascope IABP Adapter**: If needed, connect appropriate size Arrow pump adapter.

9. **Confirm Helium Filling Volume** is correct.

10. **Verify Trigger** recognition (ECG or A-line).

11. **Select Desired Assist Ratio** (1:1 to 1:4).

12. **Mode Selection** *(Autopilot Mode)*

13. **Pump Status to “ON”.**

14. **Ensure Proper Trigger** (ECG or A-line). Select Operator Mode to change.

15. **Ensure Proper Timing.**

16. **Secure Affected Lower Extremity.**

17. **Remove Referring ECG electrodes** (once all transfer to transport IABP is complete).

18. **Continued Assessment** (site/catheter, pressures, pulses, urine output) and **Documentation**.

19. Do not elevate head of bed >30 degrees. Only log roll for positioning.

**Calibrating Fiberoptic Catheter**

1. Place IABP in 1:2.

2. View Assisted and Unassisted MAP.

3. Select AP Key.

4. Press FOS Cal Key.

5. Move < & > keys until FOS MAP is equal to Unassisted MAP.
IABP Special Considerations & Troubleshooting

Required Assessment & Documentation:

- IAB insertion site/type/size of catheter
- IABP settings
- Platelet count/PTT/INR
- Augmentation pressure prior to arrival
- Left radial/brachial pulse
- Pedal Pulses
- Urine output

Timing References:

IF DBP< Assisted Diastolic
Timing Error- Early Deflation

IF SBP< Assisted Systolic
Timing Error-Late Deflation
Other Causes:
- IAB small for aorta
- IAB volume too low
- Improper positioning of IAB

IF Augmentation < Systolic
Timing Error- Early or Late Inflation
Other Causes:
- Severe hypovolemia
- Low SVR
- IAB small for aorta
- Improper positioning of IAB
- MAP<40 mmHg

Special Considerations:

1. **Datascope**:
   a. Utilize the Datascope adapter from your IABP backpack to connect the Datascope catheter to the Arrow IABP.
   b. Ensure the appropriate balloon catheter size.
   c. *Adjust fill volume on the IABP console to the correct balloon volume by pressing balloon volume on.*

2. **Alarms** – If IABP is alarming, assess reason for alarm, then press reset and then “Pump Status On”.

3. **CPR** – The *arterial pressure trigger* needs to be selected during CPR in a 1:1 assist frequency. Go to Operator Mode → Select Trigger → Select AP. *If there is ROSC, return to previous trigger mode.*

4. **Atrial Fibrillation** – Autopilot’s choice when the rhythm is irregular. Ensure *Arrhythmia Timing is ON.*

5. **Pacing**
   a. **Atrial Pacing** – The computer uses the atrial pacing spike as the trigger signal. This mode can be used with 100% atrially paced rhythms only.
   b. **Ventricular Pacing** – The computer uses the ventricular spike as the trigger signal. This mode can be used with ventricular or AV 100% paced rhythms. To set, go to Operator Mode → Select Trigger → Select appropriate type of pacing. **Remember that patient must be 100% paced and then IABP must stay in operator mode**

6. **Trigger Failure** – If trigger failure occurs, check connections and ECG leads. If no improvement, change to Operator Mode and select the best available trigger.

7. **Loss of left radial pulse, loss of pedal pulse on side of catheter insertion, or urine output <30 ml/hr** – This indicates the catheter has migrated. Notify MDOC immediately.

8. **IABP Device Failure** – Attach a 60 ml slip-tip syringe to the balloon catheter and cycle the balloon manually once every 10 minutes. Notify MDOC immediately for further instructions.

9. **Balloon Rupture** – E.g. Blood in tubing or brown flecks noted. Notify MDOC immediately.

10. **Contact MDOC** – For any changes required to augmentation rates or changes in patient condition after transfer from bedside to transport IABP.

***Contact MDC with any questions or concerns***
# VENTRICULAR ASSIST DEVICE REFERENCE

## HeartMate II Troubleshooting Guide

<table>
<thead>
<tr>
<th>System Controller Warning Lights &amp; Sounds</th>
<th>Audio Tone</th>
<th>LOW FLOW Message</th>
<th>Meaning</th>
<th>Action</th>
</tr>
</thead>
</table>
| **Red Heart** | Steady Audio Tone | LOW FLOW HAZARD (on Display Module) | Pump flow < 2.5 lpm, pump has stopped, perf. lead is disconnected, or pump is not working properly. | 1. Make sure System Controller is connected to the pump.  
2. Make sure System Controller is connected to a power source (batteries, PBU/Power Module, or Emergency Power Pack [EPP]).  
3. If alarm continues, immediately seek additional help. |
| **NONE: No Warning Lights and No Green Power Symbol** | Steady Audio Tone | NONE | System Controller is not receiving power. | 1. Make sure System Controller is connected to a power source (batteries, PBU/Power Module, or EPP).  
2. If connected and alarm continues, switch to alternate power source.  
3. If alarm continues after switching power source, replace Controller (see afresh for instructions.) |
| **Red Battery** | Steady Audio Tone | LOW VOLTAGE | Less than 5 minutes of battery power remain, voltage is too low, or the System Controller is not getting enough power from the PBU/Power Module. | Immediately replace depleted batteries with new, fully-charged set. Change batteries one at a time. If fully-charged batteries are not available, switch to PBU/Power Module or EPP.  
**WARNING!** Do NOT remove power from both power leads at the same time, or the pump will stop.  
**Note:** Pump speed will gradually decrease to save power (i.e., “Power Saver Mode”) until the condition is resolved and the alarm clears. |
| **Yellow Battery** | 1 Beep Every 4 Seconds | Low Voltage Advisory | Less than 15 minutes of battery power remain, voltage is too low, or the System Controller is not getting enough power from the PBU/Power Module. | Immediately replace depleted batteries with new, fully-charged set. Change batteries one at a time. If fully-charged batteries are not available, switch to PBU/Power Module or EPP.  
**WARNING!** Do NOT remove power from both power leads at the same time, or the pump will stop. |
| **NONE: No Battery Light** | Broken Audio Tone (repeating cycle 1 beep per second for 2 seconds, followed by 2 seconds of silence) | REPLACE SYSTEM CONTROLLER (on System Monitor) | System Controller is operating in backup mode. | 1. Replace the System Controller (see other side for instructions).  
2. Notify the patient’s physician.  
3. Obtain a new backup System Controller.  
4. Program the new backup Controller with settings prescribed for this patient. |
| **Yellow Controller Cell** | 1 Beep Every 4 Seconds | SC Cell Module Low (on Display Module) | The battery module that powers the System Controller audible alarm is depleted. | Replace the System Controller Battery Module. |
| **Rapidly Hacking Green Power Symbol** and **Red Battery** | 1 Beep Every Second | POWER CABLE DISCONNECTED | One of the power leads is damaged or disconnected. | 1. Reconnect or tighten disconnected/torn power lead.  
2. If alarm continues, check System Controller power lead and PBU/Power Module patient cable for damage.  
3. If System Controller power lead is damaged, replace the Controller (see other side for instructions).  
If PBU/Power Module patient cable is damaged, replace PBU/Power Module patient cable.  
4. Obtain a new backup System Controller for this patient, if necessary. |
| **4 Green Battery Gauge Lights Flashing Once Per Second** | NONE on PBU/o System Monitor | WARNING: Low Speed Operation | Pump is operating below low speed limit. | Connect System Controller to System Monitor (audio alarm will stop) and increase fixed speed setting or reduce low speed limit. |
## PEDIATRIC REFERENCE

### Normal Ranges

<table>
<thead>
<tr>
<th>Age (kg)</th>
<th>Respirations Range</th>
<th>Heart Rate Range</th>
<th>Systolic Blood Pressure Range</th>
<th>Distance (CM) Mid-Trachea to Lip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preemie (1-2)</td>
<td>40-60</td>
<td>90-180</td>
<td>60-70</td>
<td>8</td>
</tr>
<tr>
<td>Newborn (3.5)</td>
<td>40-60</td>
<td>90-180</td>
<td>60-70</td>
<td>8-9.5</td>
</tr>
<tr>
<td>6 MO (7)</td>
<td>24-40</td>
<td>85-170</td>
<td>70-106</td>
<td>9.5-11</td>
</tr>
<tr>
<td>1 YR (10)</td>
<td>20-40</td>
<td>80-140</td>
<td>72-110</td>
<td>11-12.5</td>
</tr>
<tr>
<td>3 YR (15)</td>
<td>20-30</td>
<td>80-130</td>
<td>76-114</td>
<td>12.5-14</td>
</tr>
<tr>
<td>6 YR (20)</td>
<td>18-25</td>
<td>70-120</td>
<td>82-116</td>
<td>14-15.5</td>
</tr>
<tr>
<td>8 YR (25)</td>
<td>18-25</td>
<td>70-110</td>
<td>86-122</td>
<td>17-18.5</td>
</tr>
<tr>
<td>10 YR (30)</td>
<td>16-20</td>
<td>65-110</td>
<td>90-130</td>
<td>18.5-20</td>
</tr>
<tr>
<td>12 YR (40)</td>
<td>14-20</td>
<td>60-110</td>
<td>90-136</td>
<td>20</td>
</tr>
<tr>
<td>15 YR (50)</td>
<td>12-20</td>
<td>55-100</td>
<td>90-142</td>
<td>20-21.5</td>
</tr>
<tr>
<td>18 YR (65)</td>
<td>12-18</td>
<td>50-90</td>
<td>90-148</td>
<td>20-23</td>
</tr>
</tbody>
</table>

### APGAR Score

<table>
<thead>
<tr>
<th>Sign</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – Appearance</td>
<td>Blue, pale</td>
<td>Body pink</td>
<td>Completely pink</td>
</tr>
<tr>
<td>P – Pulse</td>
<td>Absent</td>
<td>&lt; 100</td>
<td>&gt; 100</td>
</tr>
<tr>
<td>G – Grimace</td>
<td>No response</td>
<td>Grimace</td>
<td>Cough or sneeze</td>
</tr>
<tr>
<td>A – Activity</td>
<td>Limp</td>
<td>Some flexion</td>
<td>Well flexed</td>
</tr>
<tr>
<td>R – Respiration</td>
<td>Absent</td>
<td>Weak, irregular</td>
<td>Strong Cry</td>
</tr>
</tbody>
</table>
# GROUND AMBULANCE TRANSPORT CHECKLIST

<table>
<thead>
<tr>
<th>EMS Provider Challenge</th>
<th>Flight Crew Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs, blood, radio, cell phone, chargers</td>
<td>Present</td>
</tr>
<tr>
<td>Equipment on-board, hard equipment secured with strap</td>
<td>Secured</td>
</tr>
<tr>
<td>Oxygen bottles secured</td>
<td>Secured</td>
</tr>
<tr>
<td>Lap belt for each flight crew member and passenger</td>
<td>Present</td>
</tr>
<tr>
<td>Adequate on-board oxygen w/ 50 p.s.i. source</td>
<td>Adequate &gt;1000 if vent</td>
</tr>
<tr>
<td>Working inverter</td>
<td>Present</td>
</tr>
<tr>
<td>Working on-board suction</td>
<td>Present</td>
</tr>
<tr>
<td>STATCOM notified of ambulance/flight crew contact information &amp; <strong>planned travel route</strong></td>
<td>Notified</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flight Crew Challenge</th>
<th>EMS Provider Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient condition/information is not presented to ambulance operator.</td>
<td>Check</td>
</tr>
<tr>
<td>STAT personnel will advise the operator when out of lap belts</td>
<td>Done</td>
</tr>
<tr>
<td>One crew member will remain awake and in front with driver between 21:00-07:00</td>
<td>Check</td>
</tr>
<tr>
<td>Expected passengers, i.e. family members, additional medical help, etc.</td>
<td>Done</td>
</tr>
<tr>
<td>Mode of transport briefing</td>
<td></td>
</tr>
<tr>
<td><em>No emergency lights/siren unless directed by flight crew</em></td>
<td>Done</td>
</tr>
<tr>
<td><em>If emergency response is indicated, vehicle will stop at all traffic lights/stop signs</em></td>
<td>Done</td>
</tr>
<tr>
<td><em>Concerns regarding ride quality, road conditions discussed as needed</em></td>
<td>Done</td>
</tr>
</tbody>
</table>
## SELECT ALS PROTOCOLS – ACLS/PALS

### SECTION 3000:

<table>
<thead>
<tr>
<th>Code</th>
<th>Protocol</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3031A</td>
<td>General Cardiac Arrest – Adult</td>
<td>100-101</td>
</tr>
<tr>
<td>3031P</td>
<td>General Cardiac Arrest – Pediatric</td>
<td>102-103</td>
</tr>
<tr>
<td>3032</td>
<td>Cardiac Arrest – Traumatic</td>
<td>104-106</td>
</tr>
</tbody>
</table>

### SECTION 5000:

<table>
<thead>
<tr>
<th>Code</th>
<th>Protocol</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5021A</td>
<td>Bradycardia – Adult</td>
<td>107-108</td>
</tr>
<tr>
<td>5021P</td>
<td>Bradycardia – Pediatric</td>
<td>109-110</td>
</tr>
<tr>
<td>5022A</td>
<td>Narrow Complex Tachycardia – Adult</td>
<td>111-112</td>
</tr>
<tr>
<td>5022P</td>
<td>Narrow Complex Tachycardia – Pediatric</td>
<td>113-114</td>
</tr>
<tr>
<td>5023A</td>
<td>Wide Complex Tachycardia – Adult</td>
<td>115-116</td>
</tr>
<tr>
<td>5023P</td>
<td>Wide Complex Tachycardia – Pediatric</td>
<td>117-118</td>
</tr>
</tbody>
</table>

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Effective 05/01/2012
GENERAL CARDIAC ARREST – ADULT

Initial Patient Contact - See Protocol # 201
Assess for pulse and monitor ECG

Cardiac arrest witnessed by ALS personnel
OR
Quality CPR in progress on ALS arrival

Perform CPR (30:2) for 2 minutes
or until defibrillator charged

Check Rhythm

If VF/VT
Shock 360 J/pulse

ROS C

Initiate IV/IO NSS
Epinephrine 1:10,000; 1 mg IV/IO every 3-5 mins

If recurrent VF
Amiodarone or Lidocaine (See Box)

Manage Airway
ETT or Alternative Airway
Apply ITD, optional
Ventilate 8-10 breaths / min

Treat Reversible Causes (See Box)

CONSIDER FIELD TERMINATION OF RESUSCITATION
OR
CONTINUE RESUSCITATION AND BEGIN TRANSPORT

Contact Medical Command

OTHER MEDICATIONS/TREATMENTS

For recurrent VF/VT:
Amiodarone 300 mg IV/IO (if available)
Lidocaine 1.5 mg/kg IV/IO

If torsades de pointes:
Administer Magnesium sulfate 2 g IV/IO (if available)

Sodium bicarbonate not indicated unless hyperkalemia or tricyclic antidepressant overdose

If hyperkalemia suspected in dialysis patient administer:
Calcium Cl (10%)10 mL IV/IO (if available)
Sodium bicarbonate 1 mEq/kg IV/IO

If hypovolemia suspected:
Give NSS 2 liters wide open.

Naloxone and Glucose are not indicated in cardiac arrest

If intubated, assess for tension pneumothorax or misplaced ETT:
If tension pneumothorax suspected, perform needle decompression
GENERAL CARDIAC ARREST – ADULT

Criteria:
A. Adult patient with cardiac arrest (may have gasping or agonal breathing).

Exclusion Criteria:
A. Cardiac arrest due to acute traumatic injury - Follow Cardiac Arrest - Traumatic Protocol #3032.
B. Cardiac arrest due to severe hypothermia - Follow Hypothermia Protocol #3035
C. Patient displaying an Out-of-Hospital Do Not Resuscitate (OOH-DNR) original order, bracelet, or necklace - see OOH-DNR Protocol #324.

Possible MC Orders:
A. Additional antidyssrhythmic therapy)
B. If tricyclic antidepressant overdose is suspected, sodium bicarbonate 1 mEq/kg IV/IO.
C. Field termination of resuscitation.

Notes:
1. Excellent CPR is a priority:
   a. 30 compressions: 2 ventilations in groups of 5 cycles over 2 minutes.
   b. Push hard and fast (≥100/min) and allow full recoil of chest during compressions by releasing hand pressure completely after each compression.
   c. Change rescuer doing compressions every 2 minutes to avoid fatigue
   d. After advanced airway, ventilation rate should be 8-10 / minute without pausing compressions to deliver ventilation. Timer on impedance threshold device (if available) or respiratory rate on ETCO₂ monitor may help to avoid harmful hyperventilation. e. Restart CPR immediately after any defibrillation attempts.
   f. Keep pauses in CPR to a minimum by charging defibrillator during CPR, restarting compressions immediately after defibrillation without checking pulse or rhythm, and avoiding pauses in CPR during airway management.
   g. Monitor CPR Quality with waveform capnography – in cardiac arrest level of ETCO₂ correlates with perfusion/cardiac output from CPR. A SUDDEN increase in ETCO₂ by >10 mmHg may indicate return of spontaneous circulation (ROSC).
2. Implantable Cardiac Defibrillator (ICD) may be present. Rescuer may receive slight shock, which is not dangerous.
3. If AED has been applied by BLS provider, skip to appropriate place in protocol that incorporates previous care. ALS providers should switch to manual defibrillator after initial AED shock.
4. Precordial thump may be used when ALS providers witness VF arrest in a monitored patient.
5. Shock at maximum output of defibrillator, up to maximum of 360 joules, for initial and subsequent defibrillation attempts.
6. Endotracheal medications are not very effective, but if IV/IO is unsuccessful, epinephrine, and lidocaine may be administered via endotracheal tube at twice the IV dose.
7. Confirm and document tube placement with absence of gastric sounds and presence of bilateral breath sounds AND continuous waveform ETCO₂ detector. Follow Confirmation of Airway Placement Protocol #2032 May insert gastric tube, if available, to decompress stomach.
8. If unable to intubate in up to 3 attempts, consider an alternative/ rescue airway device.
9. If available, an inspiratory impedance threshold device (ITD) may be placed on the end of an advanced airway or two-person BVM during CPR.
10. Repeat lidocaine, 0.75 mg/kg IV/IO, every 5 -10 minutes to a total dose of 3 mg/kg.
11. May repeat one additional dose of amiodarone, 150 mg IV/IO, after 10 minutes.
12. If possible, contact medical command prior to moving or transporting patient. CPR is much less effective during patient transportation, and any possible interventions by medical command will be less effective without optimal CPR.
13. Field termination of resuscitation must be ordered by Medical Command Physician, otherwise continue resuscitation attempts and initiate transport.

Performance Parameters:
A. Documentation of code summary from monitor /ECG rhythm strips.
B. Documentation of confirmation of advanced airway placement including documentation of gastric sounds, breath sounds and use of confirmatory device (include print out of ETCO₂ monitor if possible
GENERAL CARDIAC ARREST – PEDIATRIC

Initial Patient Contact - See Protocol # 201
Assess for pulse and monitor ECG

Cardiac arrest witnessed by ALS personnel
OR
Quality CPR in progress on ALS arrival

Perform CPR (15:2) for 2 minutes or until defibrillator charged

2 Minutes
Check Rhythm
If VF/VT
Shock 4 joules/kg
ROS C

Epinephrine 1:10,000;
0.01 mg IV/IO every 3-5 mins
(0.1 mL/kg of 1:10,000)
If recurrent VF
Amiodarone or Lidocaine (See Box)
Manage Airway BVM
Ventilate 8-10 breaths / min
Treat Reversible Causes
(See Box)

CONTINUE RESUSCITATION AND BEGIN TRANSPORT
OR
CONSIDER FIELD TERMINATION OF RESUSCITATION

OTHER MEDICATIONS/TREATMENTS

For recurrent VF/VT:
Amiodarone
5 mg/kg IV/IO
300 mg max
(If available)
OR
Lidocaine
1 mg/kg
IV/IO

If torsade de pointes:
Administer Magnesium sulfate
25-50 mg/kg Max 2 g IV/IO (if available)

If intubated, assess for tension pneumothorax or misplaced ETT:
If tension pneumothorax suspected, perform needle decompression

Sodium bicarbonate not indicated unless hyperkalemia or tricyclic antidepressant overdose
If hyperkalemia suspected, administer:
Calcium
Cl (10%)0.2 mL/kg IV/IO (if available)
Sodium bicarbonate
1 mEq/kg IV/IO

If hypovolemia suspected:
Give NSS 20 mL/kg wide open.

Naloxone not indicate arrest
If glucose <60:
Administer 50% Dextrose, 50 mL IV/IO

Contact Medical Command
GENERAL CARDIAC ARREST – PEDIATRIC

Criteria:
A. Pediatric patient (preadolescent ≤ 14 y/o) with ventricular fibrillation or pulseless ventricular tachycardia.

Exclusion Criteria:
A. Cardiac Arrest in newborns - Follow Neonatal Resuscitation Protocol #3033.
B. Cardiac arrest due to acute traumatic injury - Follow Cardiac Arrest - Traumatic Protocol #3032. C. Cardiac arrest due to severe hypothermia - Follow Cardiac Arrest - Hypothermia Protocol #3035. D. Patient displaying an Out-of-Hospital Do Not Resuscitate (OOH-DNR) original order, bracelet, or necklace - see OOH-DNR Protocol #324.

Possible MC Orders:
A. Defibrillation attempts at doses up to 10 joules/kg.
B. Additional antidysrhythmic therapy during cardiac arrest (magnesium sulfate 25-50 mg/kg (max 2 gm) IV/IO, procainamide 15 mg/kg over 15-30 min IV/IO if available)
C. If tricyclic antidepressant overdose is suspected, administer sodium bicarbonate 1-2 mEq/kg IV/IO.
D. Field termination of resuscitation.

Notes:
1. Excellent CPR is a priority:
   a. 15 compressions: 2 ventilations in groups of 10 cycles over 2 minutes (30:2 if only one rescuer).
   b. Push hard and fast (≥100/min) and allow full recoil of chest during compressions. c. Change rescuer doing compressions every 2 minutes to avoid fatigue.
   d. After advanced airway, ventilation rate should be 8-10 / minute without pausing compressions to deliver ventilation. Respiratory rate on ETCO2 monitor may help to avoid harmful hyperventilation.
   e. Restart CPR immediately after any defibrillation attempts.
   f. Keep pauses in CPR to a minimum by charging defibrillator during CPR, restarting compressions immediately after defibrillation without checking pulse or rhythm, and avoiding pauses in CPR during airway management.
   g. Monitor CPR quality with waveform capnography – in cardiac arrest, level of ETCO2 correlates with perfusion/ cardiac output from CPR. A SUDDEN increase in ETCO2 by >10 mmHg may indicate return of spontaneous circulation (ROSC).
2. If AED has been applied by BLS provider, skip to appropriate place in protocol that incorporates previous care. ALS providers should switch to manual defibrillator after initial AED shock.
3. Endotracheal medications are not very effective, but if IV/IO is unsuccessful, epinephrine, and lidocaine may be administered via endotracheal tube. Epinephrine 0.1 mg/kg (0.1 mL/kg of 1:1,000).
4. Ventilation with BVM may be as effective as endotracheal intubation in children when transport times are short. Attempt ETT intubation or alternative airway if unable to ventilate adequately with BVM.
6. Repeat lidocaine, 1 mg/kg IV, in 15 minutes (maximum total dose of 3 mg/kg).
7. If possible, contact medical command prior to moving or transporting patient. CPR is much less effective during patient transportation, and any possible interventions by medical command will be less effective without optimal CPR.
8. Field termination of resuscitation must be ordered by Medical Command Physician, otherwise continue resuscitation attempts and initiate transport.

Performance Parameters:
A. Documentation of code summary from monitor /ECG rhythm strips.
B. Documentation of confirmation of advanced airway placement including documentation of gastric sounds, breath sounds and use of confirmatory device (include print out of ETCO2 monitor if possible
CARDIAC ARREST -- TRAUMATIC

Initial Patient Contact – See Protocol # 201
Cervical spine stabilization, when indicated
Rapid extrication

Assess for evidence of DOA and apparent cause of cardiac arrest? ¹

DOA OR Medical / Non-traumatic cause

Proceed to appropriate cardiac arrest protocol OR DOA Protocol #322

Traumatic cause ²,³

Effective CPR⁴ is important
Manage Airway ⁵,⁶,⁷
- ETT or Alternative Airway, appropriate for initial airway
- Ventilate 8-10 breaths/min, after advanced airway
Assess for tension pneumothorax:
- Perform Chest Needle Decompression, if indicated
Control severe external bleeding
Rapid Transport is a priority ⁸,⁹
- Spinal immobilization as indicated ¹⁰
Consider Other Medications/Treatments
(See Box at Right)

OTHER MEDICATIONS/TREATMENTS Consider these treatments enroute if patient can arrive at a Trauma Center in < 15 minutes

Initiate IV/IO NSS
Adults: administer NSS wide open up to 2000 mL
Peds: administer NSS wide open up to 60 mL/kg

Monitor ECG / Pulse oximetry
If VF or pulseless VT, attempt defibrillation every 2 minutes (follow doses listed in VF protocols)

Epinephrine 1:10,000;
Adults: 1 mg IV/IO ¹¹ every 3-5 mins.
Peds: 0.01 mg/kg IV/IO every 3-5 mins

Monitor ETCO₂

Consider other etiologies of cardiac arrest and follow appropriate protocol

Return of spontaneous circulation (ROSC)?

YES

Follow Major Multisystem Trauma Protocol #6002

CONSIDER FIELD TERMINATION OF RESUSCITATION ¹²
OR
CONTINUE RESUSCITATION AND BEGIN TRANSPORT

Contact Medical Command

Repeat NSS bolus
Adult: up to 2000 mL wide open
Peds: up to 60 mL/kg wide open

Effective 05/01/2012
CARDIAC ARREST -- TRAUMATIC

Criteria:

A. Patient in cardiac arrest from suspected traumatic cause.

Exclusion Criteria:

A. Patient that meets DOA criteria (including un witnessed cardiac arrest of traumatic cause, decapitation, rigor mortis, etc...) – See DOA Protocol #322.
B. Patient in cardiac arrest due to medical or non-traumatic causes

Possible MC Orders:

A. Terminate resuscitation in the field

Notes:

1. If the trauma appears to be minor and a medical condition appears to be the cause of the cardiac arrest, follow the appropriate cardiac arrest protocol.
2. If cardiac arrest is witnessed by EMS provider, or there is evidence that the patient had any signs of life within a few minutes before the arrival of EMS personnel, proceed with this protocol. Otherwise, follow DOA Protocol # 322.
3. Unless there is an immediately correctable cause victims of traumatic cardiac arrest must arrive at a hospital within a few minutes to have any chance of survival. Placement of an advanced airway (ETT or Alternative Airway Device) or decompression of a tension pneumothorax may increase this very short time window for survival.
4. Excellent CPR is a priority:
   a. 30 compressions: 2 ventilations (15:2 for children and infants) in groups of 5 cycles over 2 minutes.
   b. Push hard and fast (≥100/min) and allow full recoil of chest during compressions. c. Change rescuer doing compressions every 2 minutes to avoid fatigue.
   d. After advanced airway, ventilation rate should be 8-10/minute without pausing compressions to deliver ventilation.
   e. Keep pauses in CPR to a minimum by checking rhythm when rotating rescuer doing compressions and by avoiding pauses in CPR during airway management and other interventions.
   f. Monitor CPR Quality with waveform capnography – in cardiac arrest level of ETCO₂ correlates with perfusion/cardiac output from CPR. A SUDDEN increase in ETCO₂ by >10 mmHg may indicate return of spontaneous circulation (ROSC).
5. Ventilate with BVM may be as effective as endotracheal intubation in children when transport times are short. Attempt ETT intubation or alternative airway if unable to ventilate adequately with BVM.
7. If unable to intubate on up to 3 attempts, consider alternative / rescue airway device.
8. Transport immediately if patient can arrive at a trauma center (preferred destination) or the closest hospital in ≤ 15 minutes.
   a. If the patient can arrive at the closest trauma center within 15 minutes, the patient should be taken to the trauma center even if another hospital is closer.
   b. Notify the receiving facility ASAP to allow maximum time for preparation to receive the patient.
   c. Air medical transport of patients in traumatic cardiac arrest is generally not indicated.
9. Contact medical command for possible field termination of resuscitation if the patient remains in cardiac arrest after initial resuscitation attempt and cannot arrive at the closest receiving facility within 15 minutes.
10. See Cervical Spine Immobilization Protocol # 261
11. Endotracheal medications are not very effective, but if IV/IO is unsuccessful, epinephrine, atropine, and lidocaine may be administered via endotracheal tube at twice the IV dose.
12. Field termination of resuscitation must be ordered by Medical Command Physician, otherwise continue resuscitation attempts and initiate transport.
CARDIAC ARREST -- TRAUMATIC

Performance Parameters:

A. Review all care given on scene for benefit of intervention versus potential delay to transport time. Especially procedures other than airway management and chest needle decompression in non-entrapped victims with short transport times.

B. Review for transport to appropriate destination based upon protocol.

C. Consider possible benchmark of on-scene time < 10 minutes for non-entrapped patients, although agencies may want to set goal of even less time on-scene.
BRADYCARDIA – ADULT

Initial Patient Contact - see Protocol # 201

If patient has severe hypotension or impending cardiac arrest, begin Pacing IMMEDIATELY.¹,²,³

Maintain Airway/Ventilate, if needed. Administer Oxygen Monitor ECG & Pulse Oximetry Initiate IV/IO NSS Consider 12-Lead ECG, if available

Signs or symptoms of poor perfusion? (e.g. acute altered mental status, ongoing chest pain, hypotension, or signs of shock) ⁴

NO  

YES ⁵

Second-degree AV block (Type II)  

OR

Third-degree AV block

NO

YES

Consider applying Pacer pads ⁵

Observe/Monitor

CONTACT MEDICAL COMMAND

Atropine ⁰.⁵ mg IV/IO ⁶,⁷ while preparing Pacer (May repeat if needed to maximum of 3 mg)  

Begin Pacing³,⁶,⁸

Sedation³

Pacing effective AND SBP > 100 mm/Hg

YES

CONTACT MEDICAL COMMAND

Repeat additional sedation (see box below)

NO

CONTACT MEDICAL COMMAND

Consider Dopamine Drip IV ⁹

Consider Epinephrine Drip ¹⁰

Repeat additional sedation (see box below)

Sedation Options³:  
(Choose one)  
(Tritrate to minimum amount necessary)

Midazolam 1-5 mg IV/ IO (⁰.⁰⁵ mg/kg) titrated slowly may repeat every 5 minutes until maximum of ⁰.¹ mg/kg  

OR

Diazepam ⁵-¹⁰ mg IV/ IO (⁰.¹ mg/kg) titrated slowly may repeat every 5 minutes until maximum ⁰.³ mg/kg  

OR

Lorazepam ¹-² mg IV/ IO (⁰.¹ mg/kg, max ² mg/dose) titrated may repeat every 5 minutes until maximum of ⁴ mg

Effective 05/01/2012
BRADYCARDIA – ADULT

Criteria:

A. Adult patient with heart rate less than 60 bpm with associated symptoms.

Exclusion Criteria:

A. Patient without pulse - Follow appropriate cardiac arrest protocol.
B. History or evidence of trauma - Follow appropriate trauma protocol

Possible MC Orders:

A. Additional doses of sedation or analgesia.
B. Dopamine infusion.
C. Glucagon 3-5 mg IV (0.05mg/kg) (if available) if beta-blocker or calcium channel blocker overdose is suspected. May be repeated in 10-15 minutes.
D. Calcium CI 10 mL of 10% solution IV (if available) if calcium channel-blocker overdose or hyperkalemia is suspected.

Notes:

1. When applying transcutaneous pacer for serious bradycardia or impending cardiac arrest, begin rapidly increasing the energy to obtain electrical capture.
2. Application and initiation of transcutaneous pacer should not be delayed while awaiting IV access if patient has severe symptoms.
3. Some patients may not tolerate the pacing stimulus to the skin and chest wall that occurs with transcutaneous pacing. In these cases, consider sedation if SBP > 100. (See box)
4. Consider possible etiologies:
   a. Hyper/hypokalemia, other metabolic disorders
   b. Hypothermia
   c. Hypovolemia (including vomiting/diarrhea)
   d. Hypoxia
   e. Toxins/ overdose (e.g. beta-blocker or calcium channel-blocker)
   f. Tamponade
   g. Tension pneumothorax
5. Transcutaneous pacemaker electrode pads may be applied to these patients without initiating pacing so that the pacemaker is ready if patient condition deteriorates.
6. For symptomatic high-degree (second-degree or third-degree) AV block, begin pacing without delay.
7. Atropine should be administered by rapid IV push and may be repeated every 3-5 minutes, to a maximum dose of 3 mg. Atropine is ineffective and should be avoided in heart transplant patients.
8. Start pacing at heart rate of 80 and 80 mAmmps. When initiating transtcutaneous pacing on a patient that is conscious with a perfusing rhythm, the pacing energy level should be increased gradually to a level slightly above the minimum energy required to obtain electrical capture.
9. Mix dopamine infusion using regional or service prescribed concentration, and administer 5-20 mcg/kg/min. Generally start at 5 mcg/kg/min, and increase every 10 minutes by an additional 5 mcg/kg/min until SBP >100 mmHg. **DO NOT exceed 20 mcg/kg/min unless ordered by medical command physician.**
10. Epinephrine infusion, 0.1-0.5 mcg/kg/min (7-35 mcg/min) titrated until SBP >90 mmHg. Mix epinephrine infusion using regional or agency prescribed concentration, and administer 2-10 mcg/min. **DO NOT exceed 10 mcg/min unless ordered by medical command physician.**

Performance Parameters:

A. Document presence or absence of signs of poor perfusion/ shock before and after interventions.
B. Review for appropriate use of immediate pacing before IV or atropine for patients with serious hypoperfusion or impending cardiac arrest.
C. Documentation of correct ECG rhythm interpretation and inclusion of rhythm strips and ECGs on PCR.

Effective 05/01/2012
BRADYCARDIA – PEDIATRIC

Initial Patient Contact¹ – see Protocol #201

Maintain Airway/ Ventilate, if needed²,³
Administer Oxygen
Monitor ECG & Pulse Oximetry

Continued Bradycardia

AND

Signs of Cardiorespiratory Compromise?

NO

YES

Consider contributing factors
Continue ventilation, if needed
Initiate IV/IO NSS, if needed
Consider blood glucose check

CONTACT MEDICAL COMMAND

Perform chest compressions/CPR
if HR < 60
despite oxygenation and ventilation⁵

Initiate IV/IO NSS
Check blood glucose

Epinephrine 0.01 mg/kg IV/IO⁶
(1:10,000; 0.1 mL/kg)

Suspected increased vagal tone or primary AV block

NO

YES

Epinephrine 0.01 mg/kg IV/IO
(1:10,000; 0.1 mL/kg)
Repeat every 3-5 minutes

Atropine 0.02 mg/kg IV/IO⁷
(minimum dose 0.1 mg)
May repeat once

AND/OR

Begin Pacing
(at rate up to 100 bpm)

CONTACT MEDICAL COMMAND
BRADYCARDIA – PEDIATRIC

Criteria:
A. Pediatric patient with heart rate < 60. Bradycardia in children is usually caused by hypoxia and often responds to oxygen and ventilatory support.

Exclusion Criteria:
A. Patient without pulse - Follow appropriate cardiac arrest protocol.
B. Newborn patient – Follow Neonatal Resuscitation Protocol #7090.
C. History or evidence of trauma - Follow appropriate trauma protocol.
D. Severe hypothermia – Follow Hypothermia Protocol #6081.

Possible MC Orders:
A. Dopamine or epinephrine infusion.
B. Glucagon 0.05mg/kg IV/IO (if available) if beta-blocker or calcium channel blocker overdose is suspected. May be repeated in 10-15 minutes.
C. Calcium Cl 0.2 mL/kg of 10% solution IV/IO (if available) if calcium channel-blocker overdose or hyperkalemia is suspected.

Notes:
1. Consider possible etiologies:
   a. Hypovolemia (including vomiting/diarrhea)
   b. Hypoxia
   c. Hypothermia
   d. Hyper/hypokalemia, other metabolic disorders e. Hypoglycemia
   f. Toxins/overdose (e.g. beta-blocker or calcium channel-blocker)
   g. Trauma/Tension Pneumothorax - follow appropriate trauma protocol.
2. Ventilation with BVM may be as effective as endotracheal intubation in children when transport times are short. If unable to intubate on up to 3 attempts, ventilate with BVM.
3. Confirm and document tube placement with absence of gastric sounds and presence of bilateral breath sounds AND confirmatory device (like wave-form ETCO₂ detector). Follow Confirmation of Airway Placement Protocol #2032
4. Serious signs or symptoms include:
   a. Poor perfusion - indicated by absent or weak peripheral pulses, increased capillary refill time, skin cool/mottled.
   b. Hypotension is SBP < 70 + (age x 2).
   c. Respiratory difficulty (respiratory rate >60/minute) indicated by increased work of breathing (retractions, nasal flaring, grunting), cyanosis, altered level of consciousness (unusual irritability, lethargy, failure to respond to parents), stridor, wheezing.
5. When CPR is required, a precise diagnosis of the specific bradyarrhythmia is not important. Perform chest compressions if, despite oxygenation and ventilation, the heart rate is < 60/minute and associated with poor systemic perfusion in infant or child. If severe hypothermia, do not perform chest compressions and follow Hypothermia Protocol #6081.
6. When given IV/IO, Epinephrine may be repeated every 3-5 minutes. Epinephrine 0.1 mg/kg (1:1,000, 0.1 mL/kg) flushed with 5 mL NSS may be administered via endotracheal tube, but IV/IO route is preferred.
7. Atropine administration may be repeated once in five minutes. Maximum dose is 1 mg per dose. Atropine 0.03 mg/kg flushed with 5 mL NSS may be administered via endotracheal tube, but IV/IO route is preferred.
NARROW COMPLEX TACHYCARDIA – ADULT

Initial Patient Contact – see protocol #201

Manage Airway/Ventilate, if needed
Apply Oxygen
Monitor ECG & Pulse Oximetry

Unstable with serious signs or symptoms
Related symptoms uncommon if HR <150

STABLE

IV/IO Access
12-Lead ECG, if available

Regular Narrow QRS Rhythm?

REGULAR

Consider Valsalva Maneuver

Adenosine
6 mg IV/IO (if available)
May repeat 12 mg IV

OR

Diltiazem 15-20 mg (0.25 mg/kg) IV/IO slowly
(if available)
(After 15 min., may repeat 20-25 mg
(0.35 mg/kg) IV/IO)

Contact Medical Command

Adenosine 12 mg IV (if available)

IRREGULAR

Contact Medical Command

If symptomatic from atrial fibrillation/flutter with tachycardia,

Diltiazem 15-20 mg (0.25 mg/kg) IV/IO slowly
(if available) (After 15 min., may repeat 20-25 mg
(0.35 mg/kg) IV/IO)

OR

Verapamil 5 mg IV/IO

Contact Medical Command

Consider treatments (adenosine or calcium channel blocker) under
stable regular QRS pathway

Sedation Options:
(Choose one)
(Titrated to minimum amount necessary)
Midazolam 1-5 mg IV/IO
(0.05 mg/kg) titrated

OR

Diazepam 5-10 mg IV/IO
(0.1 mg/kg) titrated to effect

OR

Lorazepam 1-2 mg IV/IO
(0.1 mg/kg, max 2 mg/dose) titrated

Effective 05/01/2012
NARROW COMPLEX TACHYCARDIA – ADULT

Criteria:
A. Symptomatic adult patients with heart rates >100 bpm and narrow QRS complex (< 0.12 sec). It is uncommon for serious symptoms to be related to tachycardia if heart rate is <150 bpm.

Exclusion Criteria:
A. Sinus tachycardia - treat underlying cause rather than rhythm. Causes may include:
   1. Trauma - Follow appropriate trauma protocol
   2. Fever
   3. Hypovolemia/ Shock

B. Wide-complex tachycardias should not be treated with this protocol (SVT with wide QRS complex may be due to Wolf-Parkinson-White, and the use of calcium channel-blockers in these patients can lead to cardiac arrest.)

Possible MC Orders:
A. Synchronized cardioversion
B. Amiodarone (if available) for narrow complex irregular rhythm or for unstable patient.

Notes:
1. Many patients who present with SVT have evidence of cardiovascular dysfunction (low blood pressure, chest pain, congestive heart failure, altered level of consciousness). Some of these patients are unstable (such as shock, pulmonary edema, decreased level of consciousness) and require immediate synchronized cardioversion. The rest who have mild hypotension, mild shortness of breath/scattered rales, chest discomfort and a GCS > 13 may be treated with medications. If the patient develops signs/ symptoms of unstable SVT at any time during treatment, proceed immediately to the cardioversion column. The following chart illustrates the continuum from borderline to critically unstable.

<table>
<thead>
<tr>
<th>Borderline</th>
<th>Unstable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low BP</td>
<td>Shock</td>
</tr>
<tr>
<td>SOB, Scattered Rales</td>
<td>Pulmonary Edema</td>
</tr>
<tr>
<td>Mild chest discomfort</td>
<td>Severe chest discomfort</td>
</tr>
<tr>
<td>Alert &amp; oriented</td>
<td>Decreased level of consciousness</td>
</tr>
<tr>
<td>GCS 14-15</td>
<td>GCS ≤ 13</td>
</tr>
</tbody>
</table>

2. Regular narrow complex supraventricular tachycardias (SVTs) include reentry AV nodal tachycardia and atrial tachycardia. Atrial flutter with 2:1 conduction may be difficult to distinguish from other forms of SVT. Adenosine is not indicated if the ECG is determined to be atrial flutter or fibrillation. If atrial flutter is identified, proceed to treatment of irregular narrow complex tachycardia. If sinus tachycardia is noted, treat the underlying cause with other appropriate protocol. Fast irregular rhythms can appear regular- measure R-R intervals to be sure.

3. Avoid carotid massage if patient is older than 50 y/o or has history of hypertension.
4. Adenosine must be given by rapid IV push (over 1-3 seconds) by immediate bolus of 20 ml NSS. Adenosine success may be enhanced by administration through an antecubital IV with the arm elevated above the level of the heart during injection.

5. **Do NOT give diltiazem or verapamil if wide complex QRS or if SBP < 100.** Calcium channel blocker medications may not be the best treatment for patients with impaired ventricular function and medical command should assist with this decision.

6. May substitute verapamil 5 mg IV/IO slowly over 3-5 minutes. May repeat once at 5-10 mg dose after 15 minutes.

7. Irregular narrow complex tachycardias include atrial fibrillation, atrial flutter, or multifocal atrial tachycardia (MAT). **DO NOT treat MAT with medications.**

8. Begin with 100 joules if using a monophasic defibrillator or if ECG rhythm is atrial fibrillation.

9. If using a biphasic defibrillator, initial and subsequent countershock energy doses should be determined by service medical director.

10. Unstable patients with known chronic atrial fibrillation may be refractory to cardioversion. Consider early Medical Command contact and rapid transport.

**Performance parameters**
A. Review for correct documentation of rhythm and for inclusion of rhythm strip in PCR
B. Review for documentation of vital signs and rhythm after each medication or cardioversion.
NARROW COMPLEX TACHYCARDIA – PEDIATRIC

Initial Patient Contact – see protocol #201

 Manage Airway/ Ventilate, if needed
 Apply Oxygen
 Monitor ECG & Pulse Oximetry Consider 12-Lead ECG, if available and patient stable

Probable SVT

• History of abrupt rate changes
• P waves absent/abnormal
• HR not variable
• Infants: rate usually ≥ 220 bpm
• Children: rate usually ≥ 180 bpm

Probable Sinus Tachycardia

• Known cause
• P waves present/normal
• Constant P-R; variable R-R
• Infants: rate usually < 220 bpm
• Children: rate usually < 180 bpm

Probable SVT

Unstable with signs of Poor Perfusion

STABLE

Consider vagal maneuvers
Initiate IV/IO NSS

Adenosine 0.1 mg/kg IV/IO
Maximum 6 mg
(if available)
May repeat with 0.2 mg/kg IV/IO
Maximum 12 mg

Unstable 1

Initiate IV/IO NSS Sedation
before cardioversion
if conscious (see box at right)

DO NOT delay cardioversion

If IV/IO readily available,
Adenosine 0.1 mg/kg IV/IO
Maximum 6 mg
(if available)
May repeat with 0.2 mg/kg IV/IO
Maximum 12 mg

If HR >180, consider
Synchronized Cardioversion
0.5 - 1 joules/kg
If no conversion, repeat
at 2 joules/kg

Contact Medical Command

Probable Sinus Tachycardia

Assess for cause of sinus tachycardia

Follow other appropriate protocol

Sedation Options:
(Choose one)
(Titrated to minimum amount necessary)
Midazolam 0.05 mg/kg IV/IO
(available)
Diazepam 0.1 mg/kg IV/IO
(available)
Lorazepam 0.1 mg/kg IV/IO
(max 2 mg/dose)
NARROW COMPLEX TACHYCARDIA – PEDIATRIC

Criteria:

A. Pediatric (preadolescent ≤ 14 years of age) patient presenting with narrow QRS complex (≤ 0.08 sec) and symptomatic heart rates greater than normal for age.

Exclusion Criteria:

A. Tachycardia in trauma patients (see appropriate trauma protocol)


Possible MC Orders:

A. Amiodarone (if available) 5 mg/kg IV/IO infused over 20-60 minutes.

B. Procainamide (if available) 15 mg/kg IV/IO infused over 30-60 minutes. Avoid administering both amiodarone and procainamide.

C. Additional synchronized cardioversions.

Notes:

1. Poor perfusion is suggested by central cyanosis, tachypnea, altered level of consciousness, weak or absent peripheral pulses, or hypotension for age [SBP < 70 + (2 x age)].

2. Appropriate vagal maneuvers include:
   a. Infants and young children: Cover entire face with large bag of ice without occluding the airway.
   b. Older children: Valsalva (blow through obstructed straw) and/or carotid sinus massage.

3. Adenosine must be given by rapid IV/IO push (over 1-3 seconds) by immediate bolus of 5 -10 mL NSS. Adenosine success may be enhanced by administration through an antecubital IV with the arm elevated above the level of the heart during injection.

4. In unstable patients, do not delay cardioversion for administration of sedation or trial of adenosine. In borderline unstable patients, adenosine may be tried and conscious patients should be sedated before cardioversion.

5. Possible causes of sinus tachycardia include:
   a. Fever
   b. Shock
   c. Hypovolemia (e.g. vomiting/ diarrhea, blood loss)
   d. Hypoxia
   e. Abnormal electrolytes f. Drug ingestions
   g. Pneumothorax
   h. Cardiac tamponade

Performance Parameters:

A. Review for documentation of vital signs and rhythm after each medication or cardioversion.

B. Review for correct documentation of rhythm and for inclusion of rhythm strip in PCR
WIDE COMPLEX TACHYCARDIA – ADULT

Initial Patient Contact – see protocol #201

- Manage Airway/ Ventilate, if needed
- Apply Oxygen
- Monitor ECG & Pulse Oximetry

Unstable with serious signs or symptoms ¹
Related symptoms uncommon if HR <150

STABLE

- IV/IO Access
  - 12-Lead ECG, if available
- Regular Wide QRS Rhythm?

REGULAR ²

First consider Adenosine
- 6 mg IV/IO ³,⁴ (if available)
  - May repeat 12 mg IV

IRREGULAR ⁵

Lidocaine
- 1.5 mg/kg IV/IO
  - OR
- Amiodarone
  - 150 mg IV/IO
  - infused over 10 minutes (if available)

Contact Medical Command

Contact Medical Command

Consider repeat Lidocaine
- 0.75 mg/kg IV/IO or
- Lidocaine infusion at 2-4 mg/min
  - OR
- Consider repeat
  - Amiodarone dose or
  - Amiodarone infusion (1 mg/min)
  - (if available)

Sedation Options:
(Choose one)
(Titrated to minimum amount necessary)
- Midazolam 1-5 mg IV/IO (0.05 mg/kg) titrated;
  - OR
- Diazepam 5-10 mg IV/IO (0.1 mg/kg) titrated;
  - OR
- Lorazepam 1-2 mg IV/IO (0.1 mg/kg, max 2 mg/dose) titrated

If no conversion, repeat at 200, 300, 360 joules ⁷ until conversion

UNSTABLE

- IV/IO Access
  - Consider Sedation, if conscious
    - (see box below)

DO NOT delay cardioversion

Synchronized Cardioversion
- 100 joules ⁶,⁷,⁸

If unstable, repeat synchronized cardioversion after antidyssrhythmic

Amiodarone
- 150 mg IV/IO
  - infused over 10 minutes
  - (if available)

If torsades, Magnesium
- 2 g IV/IO

Effective 05/01/2012
WIDE COMPLEX TACHYCARDIA – ADULT

Criteria:

A. Symptomatic adult patients with heart rates >100 bpm and wide QRS complex (≥ 0.12 sec). It is uncommon for serious symptoms to be related to tachycardia if heart rate is <150 bpm.

Exclusion Criteria:

A. Sinus tachycardia with aberrancy - treat underlying cause rather than rhythm. Causes may include:
   1. Trauma- Follow appropriate trauma protocol
   2. Fever
B. PEA – Follow PEA Protocol #3041A.

Possible MC Orders:

A. Synchronized cardioversion
B. Amiodarone (if available) 100 mg IV/IO infused over 10 minutes. May be repeated as needed up to 0.5 mg in 24 hours.
C. Consider sodium bicarbonate if suspected hyperkalemia or overdose.
D. Consider calcium chloride, 10 ml of 10% solution IV (if available) if suspected renal failure/ dialysis patient or overdose of calcium channel blocker.
E. Consider glucagon, 3-10 mg (0.05mg/kg) IV (if available) if suspected calcium channel blocker overdose that is unresponsive to calcium chloride.

Notes:

1. Many patients who present with wide complex tachycardia have evidence of cardiovascular dysfunction (low blood pressure, chest pain, congestive heart failure, altered level of consciousness). Some of these patients are unstable (such as shock, pulmonary edema, decreased level of consciousness) and require immediate synchronized cardioversion. The rest who have mild hypotension, mild shortness of breath/scattered rales, chest discomfort and a GCS >13 may be treated with medications. If the patient develops unstable signs/symptoms at any time during treatment, proceed immediately to the cardioversion column. The following chart illustrates the continuum from borderline to critically unstable.

   **Borderline**  
   - Low BP
   - SOB, Scattered Rales
   - Mild chest discomfort
   - Alert & oriented
   - GCS 14-15

   **Unstable**  
   - Shock
   - Pulmonary Edema
   - Severe chest discomfort
   - Decreased level of consciousness
   - GCS < 13

2. Regular wide complex tachycardias include ventricular tachycardia and SVT with aberrancy. If the patient has a previous history of coronary artery disease, then VT is most likely. If SVT with aberrancy is suspected, adenosine (if available) may be tried. If sinus tachycardia is noted, treat the underlying cause with other appropriate protocol.
3. Vagal maneuvers may be considered. Avoid carotid massage if patient is older than 50 y/o or has history of hypertension.
4. Adenosine must be given by rapid IV push (over 1-3 seconds) by immediate bolus of 20 mL NSS. Adenosine success may be enhanced by administration through an antecubital IV with the arm elevated above the level of the heart during injection.
5. Irregular wide complex tachycardias include atrial fibrillation, pre-excitation atrial fibrillation, polymorphic VT and torsades de pointes.
6. Begin with 100 joules if using a monophasic defibrillator or if ECG rhythm is atrial fibrillation.
7. If using a biphasic defibrillator, initial and subsequent countershock energy doses should be determined by service medical director.
8. Unstable patients with known chronic atrial fibrillation may be refractory to cardioversion. Consider early Medical Command contact and rapid transport.

Performance Parameters:

A. Review for correct documentation of rhythm and for inclusion of rhythm strip in PCR.
B. Review for documentation of vital signs and rhythm after each medication or cardioversion.
WIDE COMPLEX TACHYCARDIA – PEDIATRIC

Initial Patient Contact – see protocol #201

- Manage Airway/ Ventilate, if needed
- Apply Oxygen
- Monitor ECG & Pulse Oximetry
- Consider 12-Lead ECG, if available and patient stable

**Probable VT/ SVT**
- History of abrupt rate changes
- P waves absent/abnormal
- HR not variable

**Probable Sinus Tachycardia**
- Known cause
- P waves present/normal
- Constant P-R; variable R-R
- Infants: rate usu. < 220 bpm
- Children: rate usu. < 180 bpm

**Probable VT/ SVT**
- Unstable with signs of Poor Perfusion

**Probable Sinus Tachycardia**
- Assess for cause of sinus tachycardia

**STABLE**
- Consider vagal maneuvers
  - Initiate IV/IO NSS

**UNSTABLE**
- Contact Medical Command
  - Initiate IV/IO NSS
  
  **DO NOT delay cardioversion**
  
  If IV/ IO readily available
  - Adenosine 0.1 mg/kg IV/IO
    - Maximum 6 mg (if available)
    - May repeat with 0.2 mg/kg IV/IO
    - Maximum 12 mg

  **Synchronized Cardioversion**
  - 0.5 - 1 joules/kg
  
  If no conversion, repeat at
  - 2 joules/kg.

**Contact Medical Command**

**Lidocaine** 1 mg/kg IV/IO

**OR**

**Amiodarone** 5 mg/kg IV/IO
- infused over 20-60 minutes
  (if available)

**Sedation Options:**
- (Choose one)
- (Titrate to minimum amount necessary)
  - Midazolam 0.05 mg/kg
    - IV/IO titrated
  - OR
  - Diazepam 0.1 mg/kg
    - IV/IO titrated
  - OR
  - Lorazepam 0.1 mg/kg
    - IV/IO (max 2 mg/dose)
    - titrated

Effective 05/01/2012
WIDE COMPLEX TACHYCARDIA – PEDIATRIC

Criteria:
A. Pediatric (preadolescent ≤ 14 years of age) patient presenting with narrow QRS complex (> 0.08 sec) and symptomatic heart rates greater than normal for age

Exclusion Criteria:
A. Tachycardia in trauma patients (see appropriate trauma protocol)
C. PEA - Follow PEA Protocol # 3041P.

Treatment:
A. See accompanying flowchart.

Possible MC Orders:
A. Amiodarone (if available) 5 mg/kg IV/IO infused over 20-60 minutes.
B. Lidocaine 1 mg/kg IV/IO
C. Procaainamide (if available) 15 mg/kg IV/IO infused over 30-60 minutes. Avoid administering both amiodarone and procaainamide.
D. Additional synchronized cardioversions.
E. Consider sodium bicarbonate, 1-2 mEq/kg IV/IO, if suspected hyperkalemia or overdose on tricyclic antidepressant or cocaine.
F. Consider calcium chloride, 0.2 mL/kg of 10% solution IV (if available) and glucagon, 0.1 mg/kg IV/IO (if available) if suspected overdose of calcium channel blocker.
G. WARNING: Calcium channel blocker medications should not be given for wide QRS rhythms.

Notes:
1. Poor perfusion is suggested by central cyanosis, tachypnea, altered level of consciousness, weak or absent peripheral pulses, or hypotension for age [SBP < 70 + (2 x age)].
2. Appropriate vagal maneuvers include:
   a. Infants and young children: Cover entire face with large bag of ice without occluding the airway.
   b. Older children: Valsalva (blow through obstructed straw) and/or carotid sinus massage.
3. Adenosine must be given by rapid IV push (over 1-3 seconds) by immediate bolus of 5 -10 mL NSS. Adenosine success may be enhanced by administration through an antecubital IV with the arm elevated above the level of the heart during injection.
4. In unstable patients, do not delay cardioversion for administration of sedation or trial of adenosine. In borderline unstable patients, adenosine may be tried and conscious patients should be sedated before cardioversion.
5. May substitute lidocaine, 1 mg/kg IV/IO, repeated every 5 minutes to total of 3 mg/kg.
6. Possible causes of sinus tachycardia include:
   a. Fever b. Shock
   c. Hypovolemia (e.g. vomiting/ diarrhea, blood loss)
   d. Hypoxia
   e. Abnormal electrolytes
   f. Drug ingestions
   g. Pneumothorax
   h. Cardiac tamponade

Performance Parameters:
A. Review for documentation of vital signs and rhythm after each medication or cardioversion.
B. Review for correct documentation of rhythm and for inclusion of rhythm strip in PCR.