Patient Care Guidelines/Protocols
Advanced Providers
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Acknowledgements

This manual was prepared by the Protocol workgroup of the Medical Transport Training Department, with technical assistance, guidance and approval from Medical Transport, LLC’s Operational Medical Director(s) and medical reference documents.

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We would also like to thank all of the physicians, nurses, and EMS providers who unselfishly gave of their time and expertise in reviewing and commenting on the guidelines during the revision process. Without their input we would not be using the most well organized, progressive, and complete set of interfacility transport guidelines. Many thanks are extended to each and every person who assisted in this project.

Thanks from Medical Transport, LLC Protocol Committee Staff

*Scope of Practice provided by the Virginia Office of Emergency Medical Services and current as of last update- 2015
GOAL: To maintain the most clinically adept team for critical, high risk or problem prone patient who must be transferred after careful consideration of the risks and benefits.

STATEMENT OF PURPOSE
The Advanced Care Provider will render care to the critically ill or injured patients who are being transported to a facility that provides an equal or higher level of care, for continued treatment. In addition to standard ALS equipment utilized routinely by paramedics, the CCP or Advanced Provider with guidance and supervision of the Physician may be required to manage special equipment/medications being used on a patient provided by the transferring hospital. The Advanced Provider may need to perform advanced procedures as well as monitor and administer medications not routinely used by ALS Providers. When called for, additional personnel, such as a respiratory therapist, ICU Nurses, Physician, or additional ALS providers may accompany patient to assist in providing care. The Advanced Provider will be the team member in charge but will recognize and respect the expertise of the other caregivers onboard.

The decision to transfer a patient rests with the referring physician (or other care provider such as a physician assistant/Nurse practitioner). This physician bears the responsibility for the transfer decisions. It is the referring physician who must:
1. Determine whether the benefits of transfer outweigh the risks.
2. Ensure that the patient is properly stabilized to the best of his/her ability prior to departure.
3. Be responsible for complying with currently accepted community standards of practice regarding interfacility transfer.

The Advanced Provider, and the referring physician, assume responsibility for management of the patient, given the circumstances of the patient’s condition, while transferring between facilities.

This protocol recognizes that there will be certain situations where potentially unstable patients will require transfer to another facility to obtain a higher level of care.

NOTE: This protocol is a supplement to Regional Medical guidelines and requires additional training. In this light, patient care during transport can be defaulted to that delineated by the Regional Council Medical guidelines.

REQUIREMENTS OF EMT-INTERMEDIATE AND PARAMEDIC

1. Current Virginia State or National Paramedic certification
2. Current BLS, ACLS, and PALS certifications
3. Maintain competency specific to critical care transfers
   i. Annual review of equipment and/or medication with Transport team training
      staff
4. Respond to any and all quality assurance issues identified during routine quality review
   of run reports by the medical director and/or the clinical quality coordinator.

TRANSFERRING DOCUMENTS/ WRITTEN ORDERS

It is the responsibility of the referring hospital/physician to provide appropriate documentation, which
includes a transfer form, or other documentation or verbal turnover indicating compliance with current
statutes or laws regarding patient transfers. This should include but is not limited to patient identifying
information, treatments, pertinent test results, preliminary diagnosis, reason for transfer and
verification of appropriate hospital if bypassing another hospital, names of the transferring and
receiving physicians/institutions, pertinent medical history and orders.

Each patient should have a unique set of written orders provided by the referring physician, specific to
the patient’s medical condition, if the patient will be treated in such a way that differs from applicable
local guidelines and Medical Transport, LLC patient care guidelines.

Any concerns regarding the patients written orders should be voiced to the physician caring for the
patient prior to transport.

The Advanced Provider will receive written orders via ePCR, with appropriate physician signature. If
physician does not provide written orders documented or signed in the ePCR format, it will need to be
completed on paper with applicable signatures, and two copies will be made. One copy will be sent with
the paperwork in accordance with SOG 206- Records Maintenance. The other will be given to the
receiving facility with any other turnover paperwork.

Must have the name and phone number of the transferring Physician as well as the receiving Physician
readily available in the event you need to contact them for unexpected problems or for clarification or
orders provided.

OBJECTIVES:

1. **Optimize** pre-departure interventions to diminish the potential for enroute
deterioration.

2. **Respond** aggressively to enroute deterioration with interventions guided by the
guidelines, and communication with the Physician, if necessary.

3. Seek to achieve **application** of tertiary care perspective and technology to integrate the
care of the patient from the referring source into that of the receiving facility.

POLICY: The Transport Team, under the guidance of the designated Physician will follow the outlined
guidelines and procedures to meet the needs of the patient, their family members and the referring
staff. These guidelines will apply to the paramedic and nurse disciplines of the Advanced Provider.
At the referring hospital:

1. Introduce yourself and the team members.
2. Unless the patient is in extremis, one crewmember may initiate care while the other retrieves report.
3. Review radiology reports, EKG’s, lab information, etc. and perform a physical exam with emphasis on the pertinent systems. Collect the pertinent information for the care of the patient during transport and hand-off.
4. Proceed with stabilization utilizing standing guidelines. If the management of the patient is beyond the scope of these guidelines, or if you have reason to believe these guidelines do not apply, confer with the Physician for consultation and guidance.
5. Work with referring staff as much as possible. To the extent possible, explain what you’re doing and why.
6. Before leaving the referring hospital, have the patient and family visit if possible.
7. Explain the patient’s condition and probable course. It is important to have a clear set of expectation for families and providers.
8. The transport team should give a complete report to the receiving unit and leave documentation of the care provided during the transport. Feedback information must be given as well.
9. The medications discussed in these guidelines MUST be obtained from the referring hospital prior to transport if not available in your drug box.
10. All medications listed in these guidelines are to be considered IV/IO unless otherwise stated.

Note: This guideline manual will not suffice as a tutorial or substitute for training, education, experience and a commitment by providers to lifelong learning.

Authority:

Medical Transport, LLC Advanced Provider Guidelines are developed by consensus of senior providers under Virginia Emergency Medical Services Regulations 12 VAC-31-2730 (Performance Standards). Our agency PHYSICIAN must approve these guidelines and has the authority to limit these guidelines.

Virginia Emergency Medical Service Regulations 12VAC 5-31-1040 (Responsibilities of Operational Medical Directors) states EMS personnel may only provide emergency medical care while acting under the authority of the operational medical director for Medical Transport, LLC and within the scope of the EMS providers’ certification.

Equipment and Medications:

As Medical Transport, LLC services a wide variety of customers and facilities, it is important to understand that the listed medications or listed interventions should be initiated, or obtained from the referring facility. These guidelines should be used as a guide with additional information. If there are
medications that were ordered by the referring physician, and the crew must obtain the medications or needed supplies or equipment needed for continuum of care from the facility staff prior to transport.

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<td>Patient Care Guidelines (PCG)</td>
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1. Universal precautions
2. Vital sign monitoring commensurate with clinical manifestation of the patient and, at a minimum, every 15 minutes.
   a. As patient acuity dictates, interventions include
      i. Cardiac Monitor
      ii. Pulse Oximeter
      iii. Capnography
         a) Nasal
         b) Intubated
   iv. Serial monitoring of vital signs/assessments
      a) Every 15 minutes for a stable patient with a minimum of 2 sets of vital signs for all ALS and SCT transports.
      b) Every 5 minutes for an unstable patient
      c) Every 5 minutes for any patient receiving cardioactive, vasoactive or anticoagulant medication drips.
      d) ANY deviation from the company standard pertaining to frequency of vital sign assessments must be documented with justification.
3. Analgesia and sedation appropriate to the patient’s condition
4. Appropriate airway management
5. Appropriate respiratory assistance
   I. Oxygen therapy via Nasal Cannula, NRB, or other device as appropriate for the patient condition
6. Appropriate ventilator management, when applicable
7. Reliable intravenous access for medication and fluid administration
8. Appropriate fluid therapy and bleeding control
9. Gastric decompression as indicated for patient condition
10. Identify or obtain a thorough history and physical exam
11. Identify or obtain diagnostic information necessary to support a working diagnosis and the treatment plan that follows
12. Aseptic technique for all invasive procedures
13. Unless specified, all medications are to be administered via peripheral IV or IO
14. Continuous waveform Capnography for ALL intubated patients
15. Continuous waveform monitoring if the patient has a PA/Arterial Catheter or ICP monitor
16. Documented blood glucose in patients with altered mental status
17. Provide complete verbal report to receiving staff
18. Assure referring assessment, diagnostics, and treatments have been included in transfer of care
**INDICATIONS:** Any patient who presents with an obstructed airway, apnea, or compromised spontaneous oxygenation and ventilation

**OBJECTIVE:** To achieve secure, adequate, protected, and stable exchange of gases, oxygenation and ventilation, of the patient during the entire transfer operation.

**PROCEDURE:**
1. Maintain cervical spine precautions in all patients suspected of spinal trauma.
2. Administer FiO2 appropriate for patient’s condition.

**Clinical Indications and Required Equipment:**

1. **Respiratory Distress and hypoxia**
   a. Nasal Cannula
   b. Air Entrapment Mask (Venturi Mask)
   c. Non-Rebreather Mask.
   d. Bag valve mask ventilation

2. **Obstructed Airway**
   a. Foreign body: Magill forceps (after Heimlich maneuver)
   b. Vomitus: Yankauer tip suction
   c. Blood/Saliva: Yankauer tip suction
   d. Tongue: Oral airway and jaw thrust or chin lift
   e. Severe facial/neck trauma: Intubation, supraglottic airway device or surgical airway, when attempts at oral or nasal endotracheal intubation are unsuccessful (see protocol)

3. **Apnea**
   a. Bag valve mask ventilation with oral airway: Initiate as temporizing maneuver
   b. Oro-tracheal Intubation: Preferred under all circumstances.
   c. Supraglottic Airway Device: For use when endotracheal intubation has failed.
   d. Surgical airway: When endotracheal intubation is unsuccessful, after using all other methodologies and devices.

4. **Ineffective oxygenation, but spontaneous ventilation**
   a. Rapid sequence induction (RSI).
      i. Refer to Protocol 2.3. Intubation; Pharmacologically assisted or rapid sequence induction (RSI)

5. **Anticipated clinical course**
   a. Deterioration – suspected or anticipated
   b. Transport – safety to crew or patient
   c. Impending compromise – i.e. inhalation injuries, angioedema
**INDICATIONS:** The Advanced Provider is directed to place a definitive airway in any patient who has little or no spontaneous ventilatory effort. If the patient has spontaneous ventilations, clenched jaw, or requires medications for placement of an endotracheal tube, LMA, or King Airway, refer to Section 2.3.

**RELATIVE CONTRAINDICATIONS:** Unable to oxygenate and ventilate with bag valve mask technique despite oral and nasal adjuncts.

**EQUIPMENT REQUIRED:**
1. Appropriate personal protective equipment.
2. Endotracheal tubes of appropriate size for patient.
3. Laryngoscope handles (with functioning light bulbs).
4. Various size and type of blades appropriate for patient.
5. 10ml syringe.
6. Tube securing device.
7. End tidal CO2 waveform continuous monitoring device or (Emergency Backup: Easy Cap End-tidal colorimetric device).
8. Nasal Cannula with or without integrated End Tidal Capnography monitoring system.
10. Suction.
11. Magill forceps.
12. Stylette.
15. Alternative airway devices (including King LT/S-D).
16. ECG monitor with pulse oximetry, NIBP monitor, and waveform Capnography.

**PROCEDURE:**
1. Identify the need for placement of definitive airway.
2. Assemble and prepare equipment (with back up devices) and achieve agreement with teammate on action sequence, including rescue maneuvers and contingencies.
3. Prior to initiation of airway management, assess the patient’s airway based upon comorbidities, anatomy, and concurrent injuries. Determine the appropriate technique for airway placement and identify potential complications.
4. If this is a pharmacologically assisted intubation, please refer to Section 2.3 for medication administration (Protocol 2.3 Intubation: Pharmacologically assisted or Rapid Sequence Induction).
a. Check integrity of endotracheal tube balloon.
b. Select appropriate size endotracheal tubes and blades (Preferred tube size is 8.0 mm (most adults, 7.5-8.0 mm).
c. Insert stylette if desired. (Note: The end of the stylette should not go past the “Murphy’s eye”, approximately 1 cm from distal end of tube.)
5. Apply appropriate personal protective equipment if not already completed.
6. If the patient is not pre-oxygenated, an attempt should be made to pre-oxygenate with 100% oxygen via non-rebreather prior to any intubation attempt or if possible, several (8) vital capacity breaths in order to facilitate nitrogen washout. These breaths should be ideally provided in a patient with spontaneous ventilations. In some cases, bag valve mask ventilations must also be done. **STOP intubation attempt** if oxygen saturations are less than 10% of starting saturation.
7. Intubation:
   a. **Option 1:** Oral Endotracheal Intubation (preferred)
      i. Apply external laryngeal manipulation (ELM) at the request of the provider who is performing the intubation.
      ii. If unable to ventilate patient and maintain oxygen saturations > 94%, place an oropharyngeal or nasopharyngeal airway adjunct and perform 2 person, 4 handed ventilating technique.
      iii. Maintain in-line stabilization of all trauma patients. Use Head Elevated Laryngoscopy Position to achieve optimal visualization. Adjust accordingly to maintain anatomical alignment in trauma patients
      iv. Position the patient ideally (maintain c-spine immobilization where appropriate) at a comfortable height and in the “sniffing” position.
      v. Remove any obstructing materials (i.e. front of cervical collar*, head immobilizers*, helmets) if appropriate. *If front of c-collar and/or head immobilization device is removed, manual inline c-spine stabilization MUST be maintained throughout procedure.
      vi. Remove foreign bodies and/or dentures from mouth if obstructing view.
      vii. Suction airway as needed.
      viii. While holding laryngoscope in left hand, insert blade into right side of mouth, sweeping tongue to the left.
      ix. Place the Mac blade (curved) in vallecula or the Miller blade (straight) under the epiglottis. With an upward motion, raise the epiglottis to visualize the vocal cords. **NEVER** use prying motion against the upper gums or teeth.
      x. While visualizing the vocal cords, pass the endotracheal tube through the cords approximately 0.5 cm beyond the cuff.
      xi. Adult female tube depth usually 21-22 cm.
      xii. Adult male tube depth usually 23-24cm.
      xiii. Pediatric tube depth usually 3 x the size of the tube appropriate for that size child.
      xiv. If unable to visualize the cords consider maneuvers such as External Laryngeal Manipulation.
      xv. While securely holding the endotracheal tube, remove the laryngoscope and stylette.
      xvi. Inflate the balloon with 5-10ml of air and remove the syringe.
xvii. Ventilate patient with BVM at 100% O2.

b. **Option 2.** Nasal Endotracheal Intubation (Less preferable)
   
   I. Use appropriate PPE prior to implementing this protocol.
   
   II. Check and prepare your needed equipment
   
   III. Place the patient’s head in a neutral position
   
   IV. Select the proper size ET tube and form it into a circle
   
   V. Apple topical anesthetic (if available)
   
   VI. Lubricate the tip of the tube with water-soluble gel.
   
   VII. Release the circle from the ET tube and gently insert in either nostril with the bevel of the tube towards the septum.
   
   VIII. Advance the tube until the top passes through the nasopharynx. Listen for breath sounds and look for condensation in the tube.
   
   IX. Inflate the distal cuff with 5-10 ml
   
   X. Attach bag valve mask and ventilate.
   
   XI. Secure the ETT.

9. Once the tube is placed, verification of tube placement will be accomplished using **at least** three of the following methods, one of which **must** be ETCO2 (a or b) or laryngoscopy by the second provider.
   
   a. ETCO2 Waveform Capnography
   
   b. Colorimetric ETCO2 Device (i.e. EasyCap) if waveform capnography is not available.
   
   c. Direct visualization.
   
   d. Observation of chest rise and fall.
   
   e. Auscultation of bilateral breath sounds.
   
   f. Absence of epigastric sounds with respirations.
   
   g. ETT condensation with exhalation.

**Confirmation of ETT placement is a dynamic process, requiring ongoing monitoring during transport**

10. While x-ray is a useful tool, it is not mandatory to initial evaluation of tube position
11. Secure tube with appropriate ties and devices.
12. The head of the bed should be elevated by 30 degrees and gastric decompression should be accomplished whenever possible to prevent gastric regurgitation.
13. Observe for chest rise and fall and presence of ETCO2 waveform monitor. *Note: You must ventilate the patient for a minimum of 6 breaths before this device can be deemed accurate.)*

**The standard is that ALL patients who are intubated have continuous end tidal capnography. It must be documented in the patient’s PCR.**

14. Auscultate over the epigastrium first, then the lungs, if possible.
15. If ETT placement is confirmed, continue to ventilate patient at an age/size appropriate rate and volume.
16. Intubation attempts should be limited to avoid hypoxia. If possible, the patient’s oxygen saturation should not be allowed to go below 94%.

ATTENTION: FOR REFERENCE USE ONLY WHEN PRINTED; PLEASE REFER TO ELECTRONIC DOCUMENT FOR MOST CURRENT VERSION
17. If ETT placement is unable to be confirmed, or there exists any doubt as to correct ETT placement, immediately remove ETT and oxygenate patient with a BVM and 100% oxygen. Return to Step 4.
18. If right main stem intubation is suspected (decreased or absent left sided breath sounds), slightly pull back on the ETT (1-2cm) and recheck.
19. When ETT position is confirmed, note cm marking at lip and secure the endotracheal tube with an ETT securing device.
20. Consider placing a c-collar to prevent excessive head movement and subsequent ETT displacement
21. If utilizing an Easy Cap for initial placement identification (emergent situation ONLY), switching to quantitative waveform ETCO2 monitoring should be done as soon as practical and should be maintained throughout transport. Continuous assessment of the waveform for morphology should be noted with appropriate intervention as needed. ETCO2 must be numerically documented with vital signs, and a printed strip at relinquishment of care must be attached to chart.
22. Throughout transport, the position of the endotracheal tube must be continually monitored. Reassessment must occur BEFORE AND AFTER every patient move.
23. If intubation is unsuccessful after 2-3 attempts:
   a. Consider placement of an alternative airway device (King LT/S-D airway or LMA), refer to Protocol Section 2.2.
   b. Consider maintaining a BLS airway for the duration of the transport.

**Note: An intubation attempt is defined as laryngoscopy with the intent to place a tracheal device if a desirable view is achieved, prior to a drop in saturation or BVM intervention

24. If intubation attempts are unsuccessful and BVM ventilation is ineffective:
   a. Consider surgical cricothyrotomy. Section 7.8
   b. Consider needle cricothyrotomy. Section 7.9

ADDITIONAL NOTES:
1. Be sure that documentation includes:
   a. Indication for procedure.
   b. Vital signs (including pulse oximetry) before, during and after procedure including printed ETCO2 waveforms and values.
   c. Medication routes and doses.
   d. ETT size and depth.
   e. Verification of proper placement of ETT.
2. Pediatrics: Cuffed ETT in the pediatric population is the standard. However this should not be cause for changing an otherwise functioning uncuffed ET tube, which has been previously placed. Use a length based resuscitation tape or formula (age+16)/4 for pediatrics.
INDICATIONS: It may be necessary on occasion to sedate and utilize neuromuscular blockade before or during transport to facilitate intubation of the patient with a compromised airway when standard methods have failed and would delay care. Indications for pharmacologically assisted intubation include:

1. Failure to protect or maintain the airway (i.e. GCS < 9, prolonged seizure activity)
   a. Can the patient phonate with a clear and unobstructed voice?
   b. Can the patient swallow spontaneously and handle normal oropharyngeal secretions?
2. Failure to oxygenate or ventilate (i.e. laryngospasms, ARDS, status asthmaticus)
3. Anticipated clinical course
   a. Deterioration – suspected or anticipated clinical deterioration
   b. Transport - protection of patient and/or crew during transport due to combativeness or agitation
   c. Impending airway compromise – i.e. inhalation injuries, angioedema

PROTOCOL: The Regional Protocols will be followed unless the following exceptions are met:
1. Individual or agency OMD approval required prior to implementation of this protocol.
2. There must be ONE RSI paramedic and another experienced ALS provider (Minimum of a Paramedic as a second ALS provider if the RSI is for a pediatric patient) prior to the implementation of this protocol.
3. The difficult airway management course must be successfully completed by the Paramedic prior to release as an RSI medic.
4. The use of ETCO2 monitors and SPO2 is MANDATORY for all paralyzed patients.

RELATIVE CONTRAINDICATIONS:
1. Inability to ventilate patient with pocket mask or bag valve mask techniques.

EQUIPMENT:
1. Appropriate personal protective equipment.
2. Endotracheal tubes of appropriate size for patient,
3. Laryngoscope handles (with functioning batteries).
4. ECG monitor, pulse oximetry, and waveform capnography.
5. Various sizes and types of blades appropriate for patient (with functioning bulb).
6. 10ml syringe.
7. Nasal Cannula
8. Tube securing device.
9. End Tidal CO2 waveform probe and adapter,
10. End Tidal CO2 cap (EasyCap) as back up ONLY
11. Bag Valve Mask with reservoir and PEEP adaptor.
12. Suction (functional with large rigid tip catheter).
15. Oxygen. A nasal cannula and non-rebreather mask are required.
17. Alternative airway devices (Surgical Airway equipment, King LT/S-D appropriately sized for patient).

Pharmacologically Assisted Intubation (RSI)

SUMMARY

1. PREPARATION

Oxygen
a. Monitor oxygen saturations and provide 100% oxygen by non-rebreather mask for 3 minutes at a minimum (Nitrogen Wash-out).
b. Coach patient to take 8 vital capacity breaths if possible.
c. Place nasal cannula on patient in preparation for passive apneic oxygenation. Once the patient has been sedated adequately, the nasal cannula liter flow should be turned up to 15 Liters per minute (Apneic oxygenation).
d. If patient is obtunded or if the respiratory effort is inadequate, provide 100% via BVM.

**Monitor vital signs (ECG, heart rate, blood pressure, pulse oximetry, and waveform capnography.**

Position/Spine Stabilization/Airway Anatomy

a. Place patient in appropriate position (obese patients and neonates should be placed in sniffing position to facilitate airway placement).
b. Maintain spinal stabilization as indicated. One person should be responsible for maintain precautions during the procedure.
c. Assess the patient’s airway and determine the most appropriate means of intubation and perceived difficulty. Mnemonics may guide your decision-making process.
   i. Cormack-Lehane for Intubation (Percentage of glottic opening)
   ii. LEMONS for Intubation (Look, evaluate, Mallampati, obstruction, neck mobility, sniffing position)
   iii. SHORT for Surgical airways (Surgeries of the neck, hematoma, obesity, radiation therapy, tumors)
   iv. MOANS for BVM (Mask seal, obstruction/obesity, aged patients, no teeth, stiff lungs or chest)
   v. RODS for SGAs (Restricted mouth openings, obstruction, distortion/ disruption, stiff lungs/spine)

IV Access/Meds
a. Ensure appropriate IV access. Preferably two sites.
b. Calculate ideal body weight and drug dosages.

Equipment/Backup Options
a. Have back up devices (King Airway and other airway devices) at the bedside.

NOTE: The most experienced provider should attempt the intubation once the patient is adequately sedated and paralyzed.

2. PREMEDICATION
These agents are used as appropriate and as time allows. Not always necessary or possible before intubation.

1. Atropine 0.01 mg/kg IV (Children less than one year-old receiving Succinylcholine).
   Used as a drying agent and to block bradycardia caused by laryngeal stimulation. It is also used in setting of a second dose of succinylcholine.
   a. Minimum dose: 0.1mg IV.
   b. Maximum dose 1 mg IV.
   c. Onset: Immediate Peak at two to four minutes.
   d. Duration variable.
2. Fentanyl 0.5-3.0mcg/kg IV (2-3mcg/kg for Children greater than 2 years old, Not to be used on children <2 years old). Used for blunting of circulatory responses to intubation or suspected / known increased intracranial pressure. Use caution in multisystem trauma patients.
   b. Maximum dose 250mcg IV.
   c. Onset: 1-3 min Peak: 3-20 min.
   d. Duration: 15-30 min.
   e. CAUTION: High doses can lead to chest wall rigidity
3. Lidocaine 1.0mg/kg IV/IO. Used for blunting the rapid increases in ICP for a patient who sustained a head injury or suspected lung diseases.
   a. Minimum dose: none
   b. Maximum dose: 100mg IV.
   c. Onset: 45-90 seconds
   d. Duration: 1-2 hours

3. INDUCTION (choose one)
1. Etomidate 0.3-0.6 mg/kg IV push over 30-60 seconds. Most commonly used sedative/induction agent in RSI with widest range of applications and is beneficial in the increased ICP patient. (Can be used in children > 10 years old)
   a. Maximum dose: 40 mg single dose.
   b. Onset: 15 to 45 seconds.
   c. Duration: 3-12 min.
2. Midazolam (Pediatrics) 50-150mcg/kg IV over 2-3 minutes PRN to achieve desired effect
   a. Maximum dose: 40 mg single dose.
   b. Onset: 15 to 45 seconds.
   c. Duration: 3-12 min.
3. Ketamine 1.0 - 4.5mg/kg IV (500mg max single dose). Can be considered for hypotensive and/or bronchospastic patients. It can be also used for patients in imminent arrest due to its beta-adrenergic effects. (Pediatrics – 1-2mg/kg).
a. Maximum dose: 500 mg IV single dose.
b. Onset: Less than 30 seconds.
c. Duration: 5-15 min.

4. PARALYSIS

1. Succinylcholine:
   a. Adults: 0.3-1.5mg/kg IV/IO
   b. Pediatrics: 1-2mg/kg IV/IO
   c. Infants: 1-2 mg/kg IV/IO
   d. Maximum dose: 150 mg
   e. Onset: 30 to 60 seconds (maximum peak)
   f. Duration: 4-12 min
   g. **ABSOLUTE** Contraindications to Succinylcholine:
      i. Known or suspected hyperkalemia (K+ > 5.5).
      ii. History of malignant hyperthermia.
      iii. Burns >5 days until healed.
      iv. Crush injuries (muscle damage) >5 days until healed.
      v. Spinal cord injury / Stroke >5 days – 6 months.
      vi. Neuromuscular disease, myopathy – indefinitely.
      vii. Intra-abdominal sepsis >5 days – resolution of infection.
      viii. Penetrating eye injury
      ix. Allergy to succinylcholine
      x. Previous denerving injury or disease (CVA, MS)

2. Rocuronium:
   a. Adults – Induction: 0.6 to 1.2 mg/kg,
   b. Pediatrics – (3mo-14yo) 0.6mg/kg,
   c. Not rated for <3 months old.
   d. Maximum dose: None.
   e. Onset: 60 to 120 seconds (maximum peak).
   f. Duration: Dose dependent, but typically 30-60 minutes.

3. Vecuronium (Third Line Agent):
   a. Adults – 0.08-0.1mg/kg IV push.
   b. Pediatrics – (1-10 years old) 0.1mg/kg
   c. Neonates – (<28 days) 0.1mg/kg IV
   d. Maximum dose: 250mg IV.
   e. Onset: 75 to 90 seconds (maximum peak)
   f. Duration: 60-75 minutes.

5. POST-INTUBATION
   1. Add agents that are needed for ongoing management. If sedation and analgesia are not adequate, patients can awaken, but still be paralyzed. See Protocol 2.4 for adult patients and Protocol 8.12 for pediatric patients.
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**Indications:** To optimize the post-intubation treatment of critically ill patients in terms of adequate analgesia, on-going paralysis and appropriate sedation. To differentiate the intubated patient from the non-intubated patient as regards aggressive pain control and sedation.

**Pearls, Pitfall and Considerations:** Intubated patients require aggressive pain and anxiety management. Enhanced consideration must be given to vital signs and non-verbal communication to adequately assess pain, anxiety, and seizure activity in the intubated and paralyzed patient. Some analgesic and/or sedative agents may cause or exacerbate hypotension. Non-depolarizing agents should be used if ongoing paralysis is necessary after intubation. Remember that patients can awaken but still be paralyzed. To avoid this possibility, ongoing sedation and analgesia should be done on an empiric-dosing schedule.

1. **Paralysis: Long Acting:** Use when sedative agents alone are insufficient for safe transport.

   1. **Rocuronium:**
      a. Adults - Maintenance: 0.1-0.2mg/kg IV
      b. Pediatrics - Maintenance: 0.075-0.125mg/kg
      c. Minimum dose: None.
      d. Maximum dose: None
      e. Onset: 1-3 min Peak: 3-20 min.
      f. Duration: 15-30 min.
   2. **Vecuronium:**
      a. Adult – 0.01-0.15mg/kg IV/IO 20-45 minutes PRN.
      b. Pediatric – 0.05-0.01mg/kg q 1 hour PRN
      c. Minimum dose: none.
      d. Maximum dose 250mg IV.
      e. Onset 60 to 75 seconds.
      f. Peak: 3-20 min.
      g. Duration: 15-30 min.
2. Analgesia (Choose one or a combination of the following depending on patient needs):

1. Fentanyl
   a. Adult: 1 to 3 mcg/kg IV Bolus PRN.
   b. Pediatrics: (1-12 years) 0.5mcg/kg PRN
   c. Minimum dose: none.
   d. Maximum dose 250mcg IV.
   e. Onset: 1-3 min Peak: 3-20 min.
   f. Duration: 15-30 min.
   g. Infusion: 1-2mcg/kg/hr or 25 to 200 mcg/hr. IV.

2. Morphine
   a. Adults: 2.5-5 mg IV PRN
   b. Pediatrics: 0.05-0.2 mg/kg q 2-4 hours PRN. Do not exceed 15 mg/dose
   b. Maximum dose IV. 15 mg
   c. Onset: 1-3 min Peak: 3-20 min.
   d. Duration: 15-30 min.

3. Ketamine - See below

3. Sedation (Choose one or a combination of the following depending on patient needs):

1. Midazolam
   a. Adult: 0.5-1mg over 2 minutes
   b. Pediatrics: 50-150mcg/kg IV over 2-3 minutes PRN. Maintenance 1-2mcg/kg/min
   c. Neonatal: No loading dose. Maintenance 0.5mcg/kg/min IV
   d. Maximum dose: 40 mg single dose.
   e. Onset: 15 to 45 seconds.
   f. Duration: 3-12 min.

2. Lorazepam
   a. Adults: Loading 0.02-0.04 mg/kg, Maintenance 0.02-0.06 mg/kg IV PRN
   b. Minimum dose: none.
   c. Maximum dose 5 mg IV in single dose bolus.
   d. Onset: 5-20 min Peak: 3-20 min.
   e. Duration: 15-30 min.
   f. Infusion: 0.01-0.1mg/kg/hr.

3. Propofol
   a. Adult: Maintenance 0.05-0.1 mg/kg/min IV
   b. Pediatrics: (2mo-16 years) 0.125-0.3 mg/kg/min IV
b. Maximum dose 150mcg IV.
c. Onset: 1-3 min Peak: 3-20 min.
d. Duration: 15-30 min.
e. Infusion: For maintenance of sedation or in intubated patients, 5 mcg/kg/minute; increase by 5-10 mcg/kg/minute as indicated until desired sedation level is achieved; usual maintenance 5-80 mcg/kg/minute.

**WARNING:** Routine bolusing of IV Propofol not recommended. If sedation needs to be achieved use alternative agent unless directed by referring physician.

4. **Ketamine** 0.5 mg/kg to 1.0 mg/kg IV for hypotensive and/or bronchospastic patients (this is a second tier agent). Ketamine also possesses potent analgesic properties. Not for use in patients less than 3 months of age.
   b. Maximum dose: 250mg IV
   c. Onset: 1-3 min Peak: 3-20 min
   d. Duration: 15-30 min
   e. Infusion: 0.5 to 1.0 mg/kg/min (second line agent currently).
   f. **Ketamine should not be used as procedural sedation.** A definitive airway should be in place unless otherwise directed by the Physician.
INDICATIONS: Acute bronchospasm occurs in a variety of disease processes. These include chronic disease states including chronic obstructive pulmonary disorder (COPD), emphysema, bronchitis, and congestive heart failure. Other reversible disorders include asthma. It is important for the provider to illicit a thorough history and precipitating factors. Determining a patient’s usual status of disease will enable the provider to assess the current presentation and allow for an appropriate level of treatment.

Pearls, Pitfalls and Considerations: Indications for aggressive treatment include evidence of hypercarbia, hypoxia, fatigue (to include nebulizer and other adjunctive therapies). Controlled hypercarbia is preferable to inducing barotrauma in these patients. All that wheezes is not asthma.

PROCEDURE:

1. Assess and maintain an adequate airway. Additionally, assess the patient’s respiratory and circulatory status. Watch for increasing ventilatory fatigue, which will culminate in hypoventilation and the need for intubation and ventilatory support.
2. Position of comfort (usually most comfortable sitting upright).
3. If the patient has spontaneous respirations, administer supplemental oxygen 6-15 L/minute via NC or NRB to maintain oxygen saturations of between 94 - 99%. If the patient has severe respiratory distress, consider high flow oxygen. Prepare for advanced airway management.
4. Monitor cardiac rhythm, oxygen saturation, end tidal carbon dioxide and hemodynamic status.
5. At least one IV site and maintain KVO rate.
6. Duo-Neb (Albuterol 2.5mg/ Ipratropium 0.5mg) mixed in nebulizer and given over 5-15 min. (flow rate 6-8 LPM air/oxygen). After two doses of Duo-Neb, administer continuous albuterol nebulizers PRN. Do not use Atrovent in patients with known peanut allergies.
7. If above ineffective, administer Epinephrine 1:1000 0.3mg IM, q 15 minutes X3 doses PRN) in patients with life threatening respiratory distress or refractory shock. Use with caution in patients with cardiovascular disease or over age 55.
8. If not otherwise given, consider Methylprednisolone Sodium Succinate (Solu-Medrol), 125mg IV.
9. Consider the administration of Magnesium Sulfate 2g IV over 30 minutes in patients with known history of asthma. Monitor for respiratory depression.
10. If the patient’s respiratory status continues to deteriorate, consider trial of Bi-Pap at initial settings of 10/5 with an FiO2 of 100%. Titrate accordingly. If the patient’s mental status continues to wane, prepare for emergent intubation. Induction medication of choice is ketamine for asthma.
11. In intubated patients, use MDI. Install a spacer in the ventilator circuit and extend it fully. If an HME filter is being used, remove it prior to the administration of the MDI. Insert the MDI at the top of the spacer and depress medication just prior to the inspiratory phase. Allow the patient to take several breaths and subsequently repeat. Collapse the spacer after treatment to minimize dead space.
12. Reassess respiratory status and associated vital signs.

SPECIAL CASES: Partial Airway Obstructions
1. Croup.
   a. Assess the adequacy of the airway, breathing and circulation, intervene as appropriate.
   b. Provide ventilatory support as needed. If there is concern for the patient to maintain a patent airway, consider endotracheal intubation by most experienced provider (including anesthesiology in operating room environment).
   c. Monitor and record vital signs including RR, SPO2, HR, ECG and BP.
   d. Administer high flow, high concentration oxygen.
   e. Prepare the nebulizer with racemic epinephrine (0.05 ml/kg of a 2.25% solution to a max single dose of 0.5 ml. May not exceed every 1 to 2 hours as needed for severe stridor.
   f. Connect the nebulizer to an oxygen source at 6 liters per minute.
   g. Reassess and monitor for desired effect and side effects.
2. Epiglottitis or Undifferentiated Stridor.
   a. Assess the adequacy of the airway, breathing and circulation, intervene as appropriate.
   b. Provide ventilatory support as needed. If there is concern for the patient to maintain a patent airway, consider endotracheal intubation by most experienced provider (anesthesiology in operating room environment) especially in adult or pediatric patients presenting with signs and symptoms of upper airway compromise.
   c. Monitor and record vital signs including RR, SPO2, HR, ECG and BP.
   d. Administer high flow, high concentration oxygen.
   e. If there is concern for an infectious etiology of the airway obstruction (epiglottitis, retropharyngeal abscess, etc.), the patient should have appropriate antibiotic coverage prior to transfer.
   f. Consult with On-line medical direction including referring physician for additional options of further interventions as necessary.
   g. Reassess and monitor patient during course of patient care for any changes signs and symptoms.
INDICATIONS: Any patient with signs and symptoms of acute pulmonary edema.

Pearls, Pitfalls and Considerations: Clinical evaluation should be primarily to assess for perfusion adequacy. In the initial evaluation, assess airway, breathing and circulation. Obtain history from providers and patient if possible. Obtain lab values, EKG, and echocardiogram reports. If the patient has undergone recent hemodynamic monitoring, record the following: CO, PA, PCWP, CVP, and SVR.

PROCEDURE:
1. Assess respiratory and circulatory status with special attention to respiratory fatigue, worsening dyspnea, and alterations in mental status.
2. Precipitating factors should be identified and corrected if possible. These include:
   a. Dysrhythmias.
   b. Alterations in blood pressure including hyper- and hypotension.
   c. On-going cardiac ischemia.
3. Establish and maintain adequate airway and ventilation status.
   a. Initiate oxygen therapy to maintain oxygen saturations of between 94 - 99%.
   b. Place patient in position of comfort.
   c. Consider trial of Bi-Pap Ventilation. See Protocol 7.5b.
   d. If patient in respiratory failure, consider intubation. See Protocol 2.2.
   e. Confirm placement of adjunct airway.
4. With confirmed diagnosis of congestive heart failure (based upon history, clinical exam, chest x-ray, and laboratory evaluation), medication administration can include:
   a. If MAP below 60 and systolic B/P <100: See Refractory Shock; Protocol 4.12.
   b. If MAP above 60 and systolic B/P >100:
      i. **NTG** 0.4mg SL once per minute for continuous CVP/SVR reduction if symptoms are severe.
      ii. **NTG infusion** 10mcg/min titrated every 3-5 minutes max of 200 mcg/min as needed to maintain a SBP >90.
      iii. **Morphine** 2mg, may repeat every 5 minutes to a total of 10mg.
      iv. **Furosemide** 20-80mg IV. Titrate administration based upon prior exposure to medication and hemodynamics.
      v. If shock develops please reference Protocol 4.12 Refractory Shock
5. Prior to transport, consider having an indwelling urinary catheter placed by facility to monitor urine output (*If available at the sending facility and procedure does not unnecessarily delay transport.*).
INDICATIONS: Any patient with signs and symptoms of a pulmonary embolism (PE). Staff must be able to recognize patients with history commiserate with PE provide safe and efficacious care and transport to the appropriate destination.

Pearls, Pitfalls and Considerations: Patients with PE can present with a wide variety of signs and symptoms. These can include everything from dyspnea and chest pain to profound hypotension and refractory shock.

PROCEDURE:
1. Assess patient’s airway, breathing and circulation.
2. Assess patient’s oxygenation and hemodynamic status.
3. Provide supplemental oxygen as needed to maintain oxygen saturations between 94 - 99% in patients with spontaneous respirations.
4. In patients with acute respiratory distress consider endotracheal intubation (Protocol 2.3) Intubation: Pharmacologically Assisted or Rapid Sequence Intubation (RSI).
6. In patients with suspected or confirmed pulmonary embolus, anticoagulation therapy should be considered
   a. Consult with the referring physician to assist in this decision
   b. Administration of Heparin can occur if no ABSOLUTE contraindications are present. These include:
      i. Recent surgery
      ii. Hemorrhagic CVA
      iii. Active bleeding (Other than menstruation or epistaxis)
      iv. Aortic Dissection
      v. Intracranial or Spinal cord tumors
   c. Consider facilitating transport to embolectomy capable facility
   c. Heparin
      i. Referring physician will establish the IV Heparin bolus and maintenance dosages. Verification of the order, concentration and rate must be done PRIOR to transport.
      ii. Assess laboratory reports with BNP, PT, PTT and INR
7. For persistent hypotension despite management with the preceding measures, initiation of thrombolytic therapy (per referring physician) may be considered prior to departing the referring facility.
INDICATIONS: Patient presenting with signs and symptoms compatible with acute myocardial ischemia. This can encompass patients who have angina symptoms to those patients experiencing STEMI or Non-ST Elevation Myocardial Infarctions.

Pearls, Pitfalls, and Special Considerations:

1. Identify patient as candidate for primary percutaneous coronary intervention or thrombolytic therapy.
   a. Inclusion Criteria:
      i. 12 hours or less from onset of symptoms
      ii. ECG showing new BBB or ST Elevation >1mm in 2 consecutive leads.
      iii. Other STEMI equivalents or ACS syndromes that have been identified by involved providers.
   b. Exclusion Criteria (Absolute):
      i. Active or recent internal bleeding (<10 days)
      ii. History of stroke < 6 months or any Hemorrhagic stroke
      iii. Intracranial or Interspinous surgery / trauma within past 2 months
      iv. Recent trauma or surgery at a non-compressible site < 10 days
      v. Suspected Aortic Dissection or Pericarditis
      vi. Known allergy to specific thrombolytic agent
   c. Exclusion Criteria (Relative):
      i. Known Bleeding disorders
      ii. Pregnancy
      iii. Severe Uncontrolled Hypertension (SBP>200 or DBP>120)
      iv. CPR > 10 minutes
      v. Current Coumadin therapy with INR>2
      vi. Hemorrhagic Ophthalmic conditions
      vii. Ischemic stroke > 6 months
      viii. Recent puncture or procedure to non-compressible blood vessel
      ix. Significant trauma or major surgery >2 weeks <2 months.

2. Prior to transport, distinguish location of myocardial infarction. Anticipate added fluid requirements and bradydysrhythmias for proximal RCA lesions (including Inferior Wall Myocardial infarctions). V4R should be completed to rule out right-sided MI.

3. Beta Blockers should be used with caution in ACS patients. It should only be used in patients who are having cardiac symptoms and are truly hyperdynamic with elevated blood pressure and
heart rate. The administration of a beta-blocker would be after the discussion with the physician.

4. Time is muscle; deferring treatment and diagnostic procedures for transport with the intent of shortening the time interval spent at the scene or sending facility, may be the best practice for these patients.

PROCEDURE:

(For patients receiving thrombolytic therapy or Non-STEMI patients).

1. Assess and manage airway, breathing and circulation
2. Initiate cardiac monitoring, pulse oximetry and serial vital signs.
3. Obtain or review a recently obtained 12 Lead EKG and interpret the findings. Assess for dysrhythmias and treat per appropriate Protocol.
4. IV access (consider 2 sites) and infuse at a maintenance rate if blood pressure is stable, bolus fluids if hypotensive (SBP <90mmhg).
5. Consider placing combo pads prior to transport. Have external pacer on standby if indicated.
6. Position patient on semi fowler’s position, unless hypotensive.
7. Treat arrhythmias per Regional Guidelines.
8. Treatment sequence, (continue sequence if already initiated by referring facility):

TREATMENT GOAL IS RELIEF OF PAIN

a. **NTG** 0.4mg, spray 1 SL q 3-5 min x 3 for chest pain as tolerated by BP. Check BP after each dose, maintain SBP>90mmHg and MAP >60.
   i. Use contraindicated in the presence of a Right Sided MI.
   ii. If the patient has received a dose of Viagra within the past 24 hours or a dose of Cialis or Levitra within the past 72 hours, NTG is contraindicated.

b. **ASPIRIN** 81-324 mg PO unless contraindicated by a true allergy. Dosage goal for full 324mg daily.
   i. Use is contraindicated in the patients with a history of GI ulcers or known bleeding disorders

c. Consider **Morphine Sulfate** 2-4mg IV/IO every 5 minutes as needed. May titrate to chest pain with stable BP (SBP >100) and mental status. If patient develops depressed respirations give **Narcan** IV/IM/OI/IN. If symptomatic arrhythmia develops, follow regional protocol. Patient may also be medicated with **Fentanyl** 0.5-2mcg/kg IV/IO/IN.

d. If pain is not relieved consider NTG via continuous IV infusion. Initiate at 10mcg/minute. Max 200 mcg/min. Titrate NTG in increments of 5 mcg/min increments q 15 minutes for relief of pain while maintaining a SBP of >100 systolic and a MAP of >60
   i. If the patient’s SBP drops below 100 systolic, consult with physician.
   ii. Decrease the NTG drip 50% (1/2).
   iii. Reference **Protocol 4.12** in the acute management of hypotension.

9. Early contact and notification of any changes in patient status to receiving facility.

SPECIFIC PRECAUTIONS:

Suspicion of an acute MI is based entirely on patient presentation. Do NOT be reassured by a “normal” monitor strip. Conversely, “abnormal” strips (particularly ST and T changes) can be due to technical factors or non-acute cardiac disease. ST elevation that changes after NTG administration can be significant and should be documented.
Beware of IV fluid overload in potential cardiac patients
Check bilateral BP’s and palpate femoral pulses.
Early notification for the receiving facility, of changes in patient status must be initiated.

Policy Number: 3.2

Section/Section Code: Patient Care Guidelines (PCG)

Subject: Cardiac Arrhythmias

Creation Date: February 14, 2016

Revision Date: July 6, 2018

Affected Departments: All Departments

Pages: 2

Effective Date:

Purpose:
Describes the appropriate treatment for a patient with cardiac arrhythmias.

Policy:
All Advanced Providers are expected to recognize and appropriately treat arrhythmias based on accepted ACLS standards or Regional Guidelines.

Specific Information Needed:
1. Past medical history, age, medications, allergies.
2. Onset of symptoms (sudden, gradual, precipitating events).
3. Prior cardiac disease (arrhythmias, pacemaker, cardiac medications), exercise level.
4. Associated symptoms: chest pain, dizziness, syncope, trouble breathing, abdominal pain, fever.

Specific Objective Findings:
1. ECG, Vital signs, SpO2.
2. Signs of poor cardiac output:
   a. Altered level of consciousness
   b. "Shacky" appearance: cool/clammy, pallor, decreased capillary refill
   c. Blood pressure < 90 systolic, narrowing pulse pressure, increased HR
3. Signs of cardiac failure:
   a. Neck vein distention
   b. Lung congestion, rales.
   c. Peripheral edema: sign of chronic failure, not acute.
4. Signs of hypoxia:
   a. Agitation or Restlessness
   b. Marked respiratory distress,
   c. Cyanosis, and tachycardia,

Treatment Protocol:
1. Treat ABC’s
2. Administer moderate to high flow O2 based on oxygen needs to maintain SPO2 >94%
4. Place Cardiac monitor/Multi-function pads STAT on the patient (anterior / posterior position, if possible), for quick and hands-free cardioversion, defibrillation, or external pacing, should this become necessary.
5. Monitor and document the cardiac rhythm. Post a rhythm strip. Consider these factors:
   a. Is there a pulse corresponding to monitor rhythm?
   b. Rate: bradycardia, tachycardia normal?
   c. Are the ventricular complexes wide or narrow?
   d. What is the relation between atrial activity (P waves) and ventricular activity (QRS)?
   e. Is the arrhythmia potentially dangerous to the patient?
6. Evaluate the patient. Is the patient perfusing adequately?
7. Treat per ACLS/PALS or Regional Guidelines for presenting arrhythmia.
9. If the patient is stable and controlled, transport to receiving facility, if not consider diversion.
INDICATIONS: Successful treatment of the rapid heart rate by stabilizing the abnormal heart rhythm through therapeutic interventions.

Pearls and Pitfalls:
1. Obtain a 12 lead EKG to confirm the presence of Atrial fibrillation or Atrial flutter and document ventricular rate.
3. The rapid heart rate is considered symptomatic with accompanied by chest pain, dyspnea, diaphoresis, nausea and vomiting, or unstable vital signs.
4. Consider underlying cause of atrial dysrhythmias prior to rate control (i.e. sepsis or trauma)

PROCEDURE:
1. Manage airway, breathing, and circulation.
2. Administer supplemental oxygen to maintain SpO2 94-99%.
3. Begin cardiac, pulse oximetry and blood pressure monitoring. Consider hands-free multi-function pads to patient’s chest. May proceed directly to cardioversion if patient becomes unstable.
4. Establish IV access of 0.9 % NS or LR at KVO rate.
5. If patient is symptomatic, consider the following:
   a. Diltiazem 0.25 mg/kg IV/IO push over 2 minutes. If not effective in 15 minutes, a second dose of 0.35 mg/kg IV may be given. If effective, begin Diltiazem infusion at 5 – 15 mg/hour.
   -OR-
   b. Metoprolol 5 mg IV/IO push over 2 minutes. May repeat x 2 every 5 minutes to a total of 15 mg. Obtain an optimal heart rate of 50-60 BPM.
      i. Note: Avoid with patients in CHF, heart block, valvular failure, cocaine use, HR < 50, or systolic BP < 90mmHg.
   -OR-
   c. Amiodarone 150 mg IV in 100 ml NS given in drip over 10 minutes.
6. If patient is unstable (systolic BP < 90 mmHg, altered LOC, severe chest pain, pulmonary edema):
   a. Perform synchronized cardioversion at 75J, 120J, 150J, 200J, or monophasic equivalent. Consider sedation or analgesia per Protocol 6.3 Analgesia or Protocol 6.4 Sedation for the patient with anxiety or agitation (Non-intubated).
**INDICATIONS:** Increased brain temperature contributes to ischemic brain damage in patients post cardiac arrest. Studies have shown that lowering brain temperature, even by a few degrees decreases ischemic damage. This procedure is to be implemented at the discretion of the referring physician.

**Patient Inclusion Criteria:**
1. Age 18+ (less than 18, consult with physician)
2. Cardiac arrest from any malignant arrhythmia & ROSC.
3. Cannot follow commands/Comatose.
4. Intubated with mechanical ventilation required
5. SBP can be maintained at 90mmHg or greater, spontaneously or with fluids, vasopressors, and/or inotropes.
6. Less than 6 hours since ROSC and less than or equal to one hour of resuscitation time.
7. Less than 15 minutes from collapse to CPR. (If time unknown, err on starting therapeutic hypothermia)

**Patient Exclusion Criteria:**
1. Continuing significant cardiac arrhythmia or hemodynamic instability.
2. Evidence of sepsis.
3. Active severe bleeding
4. Coma unrelated to arrest. (i.e. drug overdose)
5. Recent major surgery or trauma
6. DNR or any condition precluding treatment in the opinion of the transferring physician.
7. Pregnancy is NOT an exclusion criterion.

**Procedure:**
1. Discuss with accepting providers and institution about the initiation of therapeutic cooling.
2. Evaluate and record neurologic status prior to initiation of sedatives and paralytics if possible.
3. However, if a provider is unavailable, initiate cooling as early as possible. Temp goal should be 32-36 degrees Fahrenheit per 2015 AHA ACLS guidelines.
4. Sedate and paralyze the patient as per Protocol 2.3. Suppress shivering with neuromuscular blockade.
5. Rapid IV infusion of ice cold (4°C). LR. Administer 30 ml/kg IVx1 dose over a period of 30 minutes immediately after neuromuscular blocking agent administered. Maximum of 2 liters LR during transport.
6. Apply ice packs to patient’s neck, axilla, and inguinal area after patient is sedated and paralyzed and iced LR is administered IV.
7. If patient shivering increase sedative and/or analgesia dose prior to increasing paralytic.
8. Monitor temperature via esophageal, rectal, or Foley temperature probe—as time and mission allow.
10. Early contact and notification of any changes in patient status to receiving facility.
INDICATIONS: This protocol addresses patients with complications from diabetes mellitus including those patient experiencing hypoglycemia, hyperglycemia, or diabetic ketoacidosis is indicated.

Pearls, Pitfalls, and Considerations: Diabetic Ketoacidosis represents a state of disordered metabolism in which the level of hyperglycemia may not fully describe or comport with the other metabolic changes such as potassium depletion or ketoacidosis. Repletion of potassium, fluids, and correction of the acidotic state must proceed deliberately and with due regard for the time interval in which this patient has been experiencing this condition. Overly aggressive administration of insulin, fluids, potassium, and sodium bicarbonate will produce untoward outcomes. Hyperglycemia from other etiologies other than that of DKA should be ruled out before applying this protocol.

1. Hypoglycemia
   a. Determine serum glucose level with point of care device (Accu-check Fingerstick).
   b. IV access with large bore IV (18 gauge or greater) if not already established by the sending facility.
   c. Initiate Intravenous fluids with 0.9% Normal Saline initially at TKO rate.
   d. Maintain appropriate hemodynamic status blood pressure with fluid resuscitation as indicated.
   e. Treatment of known diabetic with decreased LOC or patient with altered mental status with hypoglycemia:
      i. If measured glucose level is low (FSBG < 60 MG/DL):
         - OR -
         ii. D50 25g, Repeat if needed.
   g. If suspected or known ETOH abuse, consider administration:
      i. Thiamine 100mg IV over 5 minutes (Prior to Dextrose)
   h. If unable to start IV, administer:
      i. Glucagon 1mg IM.

2. Hyperglycemia
   a. If measured glucose level is high or diabetic ketoacidosis is suspected:
   b. Review lab values (if already obtained and document for chart and receiving facility):
      i. CBC
      ii. CMP, Mg, and Phos
      iii. Serum B-Hydroxybutyrate (Serum ketones)
      iv. Venous blood gas
v. UA

c. Calculate anion gap = (NA-(Cl+CO2))

d. Analyze data
e. Identify if whole blood glucose is greater than 200mg/dl
   ii. Venous pH < 7.3.
   iii. Bicarbonate (HCO3) < 15mmol/L
   iv. UA demonstrates ketones
   v. Anion gap greater than 12.

f. If above criteria are met, proceed to Section 3
g. If labs are unobtainable, do not initiate insulin therapy. Consult medical control for additional options.

h. Hyperglycemia Therapy
   i. If above criteria are not met for DKA or all data has not been obtained as outlined above, discuss with physician necessity of therapy.
   j. 0.9% Normal Saline at maintenance therapy can be initiated. In discussion with physician, rate can be adjusted based upon diagnosis and hemodynamic stability.

3. Diabetic Ketoacidosis (DKA) (Adult Patients).
   a. Meets all criteria as outlined above.
   b. Patient to remain NPO
   c. Stop insulin pump if applicable.
   d. Intravenous Fluids
   e. 0.9% Normal Saline (NS)
   f. 1000ml/h x 1h, then 500ml/h x 2h then
   g. After initial infusion of 0.9% NS, fluid should be changed to 0.45% NS
   h. 500ml/hr. for 2hrs
   i. Then, maintain maintenance at 200ml/hr.
   j. IVF should be changed to D5 0.45% NS at 200ml when Serum Glucose < 250mg/dl.
   k. IF the patient has a history of heart failure or an alternative diagnosis where fluid overload is a concern, consult physician.
   l. Initiate insulin infusion and adjust rate based upon table below.
   m. Regular insulin (100units /100ml 0.9% NS) infusion at 0.1unit/kg/hr. (typically between 6-10 units per hr.).
   n. Adjust per physician order.

4. Insulin—Insulin orders for titration MUST to be obtained from physician prior to departure.
   a. Do NOT stop infusion UNTIL all 3 criteria met:
      i. Anion gap is < 12
      ii. Serum CO2 (Bicarbonate) is greater than or equal to 20
      iii. Long acting insulin has been administered.
      iv. Physician order
   b. FSBG should be obtained q 30 mins. for every patient on an Insulin drip. There should be at least 1 FSBG assessed during every transport regardless of transport time.
      i. There should be a minimum of 1 FSBG obtained if the transport <30 mins.

5. Potassium replacement for patients in Diabetic Ketoacidosis (DKA).
INDICATIONS: Patients who present with the loss of blood in either the upper or lower tract. Patient may present with mild anemia to severe hypovolemic shock.

PEARLS, PITFALLS, and CONSIDERATIONS:
“Coffee ground” emesis or hematemesis suggest a proximal lesion and hematochezia or melena suggest a distal lesion. History of medication, alcohol use, and anticoagulants should be elicited. Octreotide has been shown to be an effective bridge to endoscopy in patients suffering from upper GI bleeding (variceal or otherwise). Octreotide is also appropriate in patients suffering from GI hemorrhage of unknown origin.

PROCEDURE:
1. Assess and monitor airway, breathing and circulation.
2. If patient has adequate spontaneous respirations, administer supplemental oxygen to maintain saturation between 94 - 99%.
3. Monitor cardiac functions (EKG, BP, P, and RR) and O2 saturations
4. Establish TWO large bore IV’s of 0.9% Normal Saline.
5. Treat for hypovolemic shock as appropriate. Use permissive hypotension strategy. Maintain MAP of 60 - 65. If patient has continued hypotension, refer to Protocol 4.12, Refractory Shock.
6. Request additional O negative blood from the referring facility prior to transport, if patient has sustained major blood loss.
7. Identify a completed INR, type and screen, and hematocrit prior to transport. If these values have not been completed, obtain I-Stat INR, hemoglobin/ hematocrit and ABG with lactate with every patient.
8. If patient has supratherapeutic INR, consider discussion of anticoagulation reversal with physician including Fresh Frozen Plasma or Prothrombin Complex Concentrate.
9. NG tubes are NOT contraindicated in patients vomiting bright red blood or with confirmed esophageal/gastric varices that have recently bled. Avoid over vigorous suction to avoid mucosal irritation
   a. Octreotide: Consider initiation of somatostatin analogues in patients with uncontrolled Upper GI hemorrhage or those patients that the source of gastrointestinal bleeding cannot be identified.
      i. I.V. bolus: 40-80 mcg in 100ml over 20 minutes
      ii. After bolus, initiate continuous I.V. infusion of 25-50 mcg/hour (specifically indicated in end stage liver disease with esophageal varices, but should be used for all significant bleeds)
11. Consider Proton Pump Inhibitor (PPI) administration for undifferentiated gastrointestinal bleeding:
   a. Pantoprazole 80 mg IV bolus
   b. Pantoprazole infusion 8 mg/hour.
12. In cases of severe bleeding from esophageal varices
   a. Consider the use of Vasopressin:
      i. 0.2 to 0.4 units per minute
      ii. Maximum dose of 0.8 units per minute.
INDICATIONS: To identify those patients with intracranial abnormalities including hemorrhage and ischemic. Once identified, management should be tailored to blood pressure management and rapid transport to the appropriate receiving center.

PEARLS, PITFALLS, AND CONSIDERATIONS: Initial evaluation should include the differentiation between stroke and associated mimics (hypoglycemia, seizures, etc.). Subsequent management of intracranial pathology is tailored to the diagnosis. Emergent transport to the most appropriate facility should be completed efficiently and swiftly. In the setting of ischemic stroke without reperfusion and subarachnoid hemorrhage, consider neurosurgical consultation if required.

PROCEDURE:

1. Assess airway, breathing, and circulation. Maintain adequate airway and ventilation
2. If the patient has spontaneous respirations, provide supplemental oxygen to maintain oxygen saturations between 94 - 99%.
3. Determine fingerstick blood glucose. If fingerstick blood glucose less than 60mg/dl
   a. D50 25g IV
      -OR-
   b. D10 100ml bolus. Repeat as needed.
      i. Pediatric dosing: 5ml/kg
4. If IV unobtainable, consider
   a. Glucagon 1mg IM.
5. Two peripheral I.V.’s of 0.9% Normal Saline at a TKO rate.
6. Obtain vital signs and place patient on monitor including pulse oximetry and end tidal carbon dioxide as indicated. Complete a neurologic exam including appropriate stroke score (NIHSS or Cincinnati).
7. Determine exact time of onset of signs and symptoms if possible.
8. If the patient has significant alteration in mental status and cannot adequately protect the airway, consider advanced airway management with rapid sequence intubation (Protocol 2.3)
9. With airway placement, use neuroprotective strategies with fentanyl, avoidance of hypotension (SBP of less than or equal to 90mmHg) and hypoxia (PaO2 of less than 60). Refer to Protocol 2.3
10. Elevate head of bed 30 degrees. Minimize noxious stimuli and treat pain aggressively.
11. IV fluids: 0.9% Normal Saline at a TKO rate.
12. If intracranial bleeding is suspected, request INR value.
13. If the INR is elevated greater than 2.0, contact receiving center staff for option:
   a. FFP, PCC, or KCentra
14. **Vitamin K (phytonadione)** 5-10MG IV mixed in 50-100ml of 0.9% Normal Saline over 30 minutes.

15. Do not treat hypertension in prehospital patients presenting as possible stroke/TIA without physician order.

16. For inter-facility transports with a confirmed diagnosis of stroke by CT or MRI imaging, maintain following parameters or as ordered by the referring physician:
   a. **Ischemic CVA**: SBP < 180 mmHg.
   b. **Intraparenchymal Hemorrhagic CVA**: SBP < 160mmHg.
   c. **Spontaneous Non-Traumatic SAH**: SBP < 140mmHg.

17. If the patient is hypotensive with a MAP < 65mmHg with associated mental status changes, refer to Protocol 4.12. Refractory Shock.

18. If the patient is hypertensive, refer to Protocol 4.13. Hypertensive Emergencies. Initial choice of antihypertensive medications includes **Labetalol** as first line agent.
   a. Labetalol 10mg q 10 mins
   b. Max dose 300mg
   c. Goal is <180 systolic and 105 diastolic

19. The use of nitroprusside in the setting of intracerebral bleeding or ischemia is **contraindicated**.

20. There is currently a debate in the use of prophylactic anti-epileptic drugs (AED’s) in the setting of spontaneous ischemic strokes, TIA’s, or intracerebral bleeding except in the setting of SAH. Please consult with the physician for option of Levetiracetam (**Keppra**).
   a. Refer to Protocol 4.11. Seizure Management, for medication treatment if a seizure does occur.

21. If the patient received tissue plasminogen activator (tPA/Alteplase), document time of bolus and time of infusion, physician ordering, and any noted complications. This is Paramedic level only.
   a. **Vital signs MUST** be assessed every 15 minutes from the administration time of tPA.
   b. Refer to CVA Checklist retrieved at sending facility, where applicable

22. Consider placing arterial line for continuous monitoring of blood pressure.

23. If patient has intracranial pressure monitor in place, maintain CPP between 70-100 mmHg (with minimum of 60mmHg).

24. If needed administer sedation per Protocol 2.4. In the intubated patient, short acting agents such as Propofol are ideal.

25. Consider other medications for treatment of specific target organ failure; (May require dialogue with the sending physician)

26. If clinical severe neurological deterioration is occurring with signs and symptoms including altered mental status, obtundation, unequal pupils, and Cushing’s Triad (hypertension, bradycardia, and irregular respirations), consideration of medications to manage increasing intracranial pressure should be considered.
   a. **Unless specified by receiving physician**
      i. **Nicardipine** (Paramedic- only)
         1. 5mg/hr. slow infusion
         2. After 30 mins increase 2.5mg/hr. q 15 minutes
         3. Max dose: 15mg/hr.
         4. Not for routine use in COPD or CHF. Consult with physician
      ii. **Hypertonic 3% NS** (Preferred choice for all patients)
INDICATIONS:
An aortic aneurysm can develop anywhere in the ascending, descending, arch or thoracic-abdominal area of the aorta. Aortic aneurysms are commonly located below the renal arteries.

Pearls, Pitfalls, and Considerations:
A distending abdomen, absence of distal pulses, mottled and/or cyanotic distal extremities, accompanies severe hypotension from a ruptured aneurysm. The patient may have a history of severe abdominal pain, but may not have ruptured. Many patients with leaking aneurysms may need to remain mildly hypotensive to survive this complicated disease process during transport to a definitive-care facility. Aortic dissection may present as an acute stroke or AMI. Many patients with leaking aneurysms may need to remain mildly hypotensive to survive this complicated disease process during transport to a definitive-care facility. A permissive hypotensive strategy should be utilized in the resuscitation of these patients. Titrate BP to a systolic of 80 to 90 and/or a MAP of 60 or as ordered by the sending physician.

Clinical Management:
1. Rapidly assess and obtain history to include known trauma, infection, congenital condition, hypertension, atherosclerosis, known aneurysm, and onset of pain. Assessment is to include primary and secondary surveys, blood pressure in both arms, and distal pulses in all four extremities. Avoid aggressive abdominal examinations.
2. Syncope and back pain are key findings.
3. Assess airway, breathing, and circulation. Maintain adequate airway and ventilation. If the patient has any alteration in mental status or level of consciousness, consider advanced airway placement per Protocol 2.3.
4. If the patient has spontaneous respirations, provide supplemental oxygen to maintain oxygen saturations between 94 - 99%.
5. Two large bore peripheral I.V.’s.
6. Monitor patient’s hemodynamic status including continuous pulse oximetry, heart rate, and respiratory status.
7. Alert the receiving hospital for imminent surgery.
8. Titrate fluids to keep systolic blood pressure to approximately 90 mmHg systolic or a blood pressure that maintains cerebral perfusion. Consider giving blood if needed. Request placement of arterial line by the physician.
9. Request INR value.
10. If the patient demonstrates evidence of hypovolemic shock, refer to Protocol 4.12. Initial resuscitation should focus on fluid and blood administration with goal blood pressure as noted above,
11. If providing Packed Red Blood Cells, refer to Protocol 7.1a. If the patient remains hypotensive despite fluid and blood administration, refer to Protocol 4.12.
12. If the patient is anticoagulated and/or has an INR > 1.4, consider emergent anticoagulation reversal in consultation with physician.
13. Provide appropriate pain and anxiolysis per Protocol 6.3 and Protocol 6.4
14. If the patient is Hypertensive
   a. Consider aggressive analgesia and anxiolysis prior to progressing to antihypertensives
   b. Priority should be focused on systolic blood pressure control over that of the HR
   c. Use Nicardipine to achieve target SBP 90 – 100
      i. 5mg/hr. slow infusion initially. May be increased by 2.5 mg/hr. every 15 minutes. Max dose of 15 mg.
   d. If hypertension persists, contact receiving physician for other options

**Overall Management and Communication with receiving physician:**

A ruptured abdominal aortic aneurysm is a time sensitive diagnosis requiring immediate operative repair. The transport team is to ensure that scene times are minimized. Provide effective communication to ensure receiving facility is aware of diagnosis.
PURPOSE: To define, identify, and manage patients with an aortic dissection or aneurysm.

INDICATIONS: Aortic dissection begins with the formation of a tear in the aortic intima that directly exposes an underlying medial layer to the driving force (pulse pressure) of the intraluminal blood. There are two types of aortic dissections. Stanford type A involves the ascending aorta and/or aortic arch, and possibly the descending aorta. The tear can originate in the ascending aorta, the aortic arch, or, more rarely, in the descending aorta. It includes DeBakey types I and II. It requires emergent surgical repair. The Stanford type B involves the descending aorta or the arch (distal to the left subclavian artery), without involvement of the ascending aorta. It includes DeBakey type III. It is typically managed medically until complications arise.

Pearls, Pitfalls, and Considerations: Achieve maximal control of luminal flow with initial heart rate control and then subsequent BP management. Most intact aortic aneurysms do not produce symptoms. As they enlarge, symptoms can include abdominal pain, back pain, pulsatile abdominal mass, groin pain, flank pain or syncope.

CLINICAL MANAGEMENT:
1. Rapidly assess and obtain history to include known trauma, infection, congenital condition, hypertension, atherosclerosis, and onset of pain. Assessment is to include primary and secondary surveys, blood pressure in both upper extremities, and distal pulses must be assessed in all 4 extremities.
2. Assess for new heart murmurs.
3. Obtain all laboratory and Imaging reports from sending facility. EKG’s should be completed on all dissections as well.
4. Two large bore IV lines. If unable to obtain IV access, consider the placement of an Intraosseous line or having a provider/physician place a central line.
5. Place patient on monitor and have patient on continuous heart, respiratory, pulse oximetry, and end tidal CO2 monitoring.
6. Blood pressures should be completed every 5 minutes during transport.
7. Consider placement of arterial line to monitor blood pressure continuously.
   a. Morphine Sulfate 2 to 4 mg IV/IO. May repeat every 5-10 minutes as needed. Max dose of 15 mg.
9. Blood pressure management:
   GOAL FOR TREATMENT: Maintain SBP 90-100mmHg
   a. Hypotensive patient
i. Titrate fluids to keep systolic BP at 90 systolic, or that which maintains cerebral perfusion

ii. Consider PRBCs, refer to Protocol 7.1a

iii. Consider vasopressors if hypotension has not responded to fluids and blood

iv. If HR > 70 AND SBP < 90, contact receiving clinician for rate control options

b. Hypertensive patient

i. Consider aggressive analgesia and anxiolysis prior to progressing to antihypertensives.

ii. **Labetalol** 10 to 20mg IV slowly over 2 minutes. May repeat by subsequently doubling dose every 10 minutes. (20mg, then 40mg then 80mg until desired results are achieved. Maximum dose of 300mg). Physician consultation must be obtained.

iii. Use **Esmolol** to achieve HR 50 – 70 beats per minute

iv. If the patient’s BP remains elevated, consider **Nicardipine** (or another agent)
to achieve target SBP 90 – 100 mmHg

v. Refer to Protocol 4.13

10. Patients with concurrent myocardial infarction confirmed by EKG analysis.

a. Complete EKG

b. Initiate appropriate blood pressure management based upon noted vital signs. If patient is hypotensive, refer to Protocol 4.13.

c. If patient is hypertensive, refer to antihypertensive therapy protocol.

d. Avoid thrombolytics, aspirin or heparin.

e. Early contact and notification of any changes in patient status to receiving facility.
INDICATIONS: To identify those patients with septic shock. Once identified, blood cultures and appropriate antibiotic therapy and resuscitation MUST occur within 60 minutes of presentation.

Pearls, Pitfalls, and Considerations: Once identified, septic shock must be treated with aggressive crystalloid infusion to maintain urine output of greater than 0.5ml/kg/hr., a lactate less than 4.0 and a CVP of 12-15. Blood cultures and antibiotic therapy MUST occur prior to transport.

PROCEDURE:

1. Assess airway, breathing, and circulation. Maintain adequate airway and ventilation. If the patient has any alteration in mental status, consider advanced airway placement per Protocol 2.3.
2. If the patient has spontaneous respirations, provide supplemental oxygen to maintain oxygen saturations between 94 - 99%.
3. Two large bore peripheral I.V.’s. If I.V. access not possible, proceed to I/O or request sending providers to place central line catheter.
4. Place patient on cardiac monitor. Continue to monitor patient’s hemodynamic status including continuous pulse oximetry, heart rate, and respiratory status. Obtain core temperature (rectally if possible). If central venous access is available, monitor Central Venous Pressure (CVP).
5. Place patient on ETCO2 monitoring to maintain 35-45 mm Hg, in an effort to maintain serum lactate levels. As lactate rises, carbon dioxide levels fall. ETCO2 levels less than 25 mm Hg are strongly associated with serum lactate levels > 4 mmol/L.
6. Prior to departure from sending facility.
   a. Request or inquire if the administration of broad-spectrum antibiotics has occurred prior to transfer.
   b. Request lactate, if available.
   c. Fluid bolus of 30ml/kg of crystalloid for hypotension and/or a lactate greater than or equal to 4.0mmol/L. There is a small subset of patients who may require additional fluid boluses prior to vasopressor administration. Clinical judgment must be utilized including the use of urine output and other markers of resuscitation.
7. If the patient’s hemodynamic status does not improve with crystalloid infusion or the patient’s lactate remains greater than 4, refer to Protocol 4.12.
8. Vasopressor therapy initially to target a mean arterial pressure (MAP) of 65 mm Hg, refer to Protocol 4.12.
   a. Norepinephrine is the vasopressor of choice.
b. **Epinephrine** can be substituted to or potentially used as an additional agent is needed to maintain adequate blood pressure
c. **Vasopressin** 0.03 units/minute can be added to norepinephrine (NE) with intent of either raising MAP or decreasing norepinephrine use (Vasopressin is a fixed medication and is typically not titrated). It should not be used as a single agent.
d. **Dopamine** should only be used as an alternative vasopressor agent to norepinephrine only in highly selected patients (i.e. patients with low risk of tachyarrhythmias and absolute or relative bradycardia).
e. **Phenylephrine** is not recommended in the treatment of septic shock except in circumstances where:
   i. **Norepinephrine** is associated with serious arrhythmias,
   ii. Cardiac output is known to be high and blood pressure persistently compromised
f. As salvage therapy when combined inotrope/vasopressor drugs and low dose **vasopressin** have failed to achieve MAP target a trial of **DOBUTamine** infusion can be administered or added to vasopressor (if in use) in the presence of:
   i. Myocardial dysfunction as suggested by elevated cardiac filling pressures and low cardiac output
   ii. Ongoing signs of hypoperfusion, despite achieving adequate intravascular volume and adequate MAP.

8. If using vasopressor therapy, it is recommended that arterial line be placed as soon as feasibly possible.
9. If the patient remains hypotensive despite aggressive fluid resuscitation and vasopressor use, consider the administration of **hydrocortisone** (Solu-cortef) 100mg IV (from sending hospital).
10. If the patient is noted to have a hemoglobin of less than or equal to 7.0, initiate packed red blood cell infusion refer to **Protocol 7.1a** for target levels of 7.0 to 9.0g/dl.
11. Monitor blood glucose q 1-2 hours, If glucose greater than 180mg/dl, refer to **Protocol 4.1** for aggressive control of hyperglycemia.
**INDICATIONS:** Any patient for whom electrolyte replacement therapy has been initiated by the referring institution.

**POTASSIUM ADMINISTRATION PROCEDURE:**
Verify that the patient meets criteria for urine output and serum creatinine level. Generally the patient’s urine output should be more than 20ml/hr. for at least 2-hours before using this protocol. The patient’s serum creatinine level should be < 2.0 before using this protocol, unless otherwise ordered by the physician. If a serum K+ is less than 3.5, infuse KCL in concentrations no greater than 20mEq/50ml D5W (or NS if indicated) for central lines and 10mEq/100ml D5W (or NS if indicated) for peripheral lines according to the following scale per hour.

**NEVER ADMINISTER KCL IV PUSH:** It could cause BRADYCARDIA, VENTRICULAR FIBRILLATION and ARREST.

**FOR CENTRAL LINES:**

<table>
<thead>
<tr>
<th>SERUM K+</th>
<th>KCL DOSE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2.5</td>
<td>20mEq KCL q1hr x 5</td>
<td>100mEq</td>
</tr>
<tr>
<td>2.6 – 3.0</td>
<td>20mEq KCL q1hr x 4</td>
<td>80mEq</td>
</tr>
<tr>
<td>3.1 – 3.5</td>
<td>20mEq KCL q1hr x 3</td>
<td>60mEq</td>
</tr>
</tbody>
</table>

**FOR PERIPHERAL LINES:**

<table>
<thead>
<tr>
<th>SERUM K+</th>
<th>KCL DOSE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2.5</td>
<td>10mEq KCL q1hr x 10</td>
<td>100mEq</td>
</tr>
<tr>
<td>2.6- 3.0</td>
<td>10mEq KCL q1hr x 8</td>
<td>80mEq</td>
</tr>
<tr>
<td>3.1 – 3.5</td>
<td>10mEq KCL q1hr x 6</td>
<td>60mEq</td>
</tr>
</tbody>
</table>

**IMPORTANT!** Continuous cardiac monitoring is required for any patient transported on or previously given potassium as these patients are at risk of developing arrhythmias.
INDICATIONS:
To emergently treat hyperkalemia which can be due to: decreased or impaired potassium excretion i.e. acute or chronic renal failure; addition of potassium into extracellular space i.e. meds, rhabdomyolysis and hemolysis; transmembrane shifts i.e. acidosis and medication effects; or factitious hyperkalemia i.e. improper blood collection or lab error.

Mortality from hyperkalemia can be as high as 67% if severe hyperkalemia is not treated rapidly.

Pearls, Pitfalls & Considerations: The presence of typical EKG changes or any rapid rise in serum potassium indicates that hyperkalemia is potentially life threatening and warrants immediate treatment. Succinylcholine should be avoided in patients exhibiting a serum potassium above 5.5.

Hyperkalemia is defined as a potassium level greater than 5.5mEq/L. Ranges are as follows:

- 5.5 – 6.0mEq/L – mild condition
- 6.1 – 7.0mEq/L – moderate condition
- 7.1mEq/L and greater – severe condition

Possible EKG Findings:

![EKG findings of hyperkalemia](image)

Hyperkalemia
- Early — peaked T waves
- Late — Intraventricular Block
  (T wave may no longer be present)
- Other changes such as flat or absent
  P waves; ST-T changes less consistent

Procedure:
1. Confirm any potassium level > 5.5 prior to treatment unless patient is hemodynamically unstable. If IFT transport, request sending facility to confirm serum potassium.
2. Perform continuous EKG monitoring with vital signs documented every five minutes or appropriate interval.
3. Avoid calcium if digoxin toxicity is suspected. Magnesium Sulfate (2gm over 5 min) may be used alternatively, in the face of digoxin-toxic cardiac arrhythmias.
4. Individualize treatment to the patient; i.e. if the hyperkalemia is not severe, the patient may only need furosemide to enhance elimination.

**IMPORTANT!** Continuous cardiac monitoring is required for any patient currently being managed for hyperkalemia as these patients are at risk of developing arrhythmias.

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Dose</th>
<th>Onset of Effect</th>
<th>Duration of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium Gluconate</td>
<td>1 gram over 10 minutes. IV (peds-100mg/kg over 2 min)</td>
<td>1-3 minutes</td>
<td>30-60 minutes</td>
</tr>
<tr>
<td>Sodium Bicarbonate</td>
<td>1mEq/kg IV bolus (peds-1.0-2.0 mEq/kg/dose). Max dose is 100 mEq IV.</td>
<td>5-10 minutes</td>
<td>1-2 hours</td>
</tr>
<tr>
<td>Insulin plus glucose. Use 1 unit of insulin to 2.5 g glucose ratio.</td>
<td>Regular insulin 10U IV (peds 0.1 IU/kg) plus 25g dextrose in 50 ml IV bolus (peds-0.5-1g/kg)</td>
<td>30 minutes</td>
<td>4-6 hours Monitor for predictive K+ drop</td>
</tr>
<tr>
<td>Nebulized albuterol</td>
<td>10-20 mg nebulized over 15 minutes (peds-2.5mg if &lt;25 kg; 5.0 mg if &gt;25kg)</td>
<td>15 minutes</td>
<td>15-90 minutes</td>
</tr>
<tr>
<td>Furosemide</td>
<td>40-80 mg IV bolus (peds-1mg/kg)</td>
<td>With onset of diuresis</td>
<td>Until diuretic effect ends</td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>2g over 5 minutes (peds-25-50mg/kg)</td>
<td>1 minute</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>

**Treatment:**

1. **Mild (5.5-6.0)**
   a. Cardiac monitor and repeat K+ en route

2. **Moderate (6.0-7.0) without EKG changes:**
   a. The above treatments (dosages noted above) &
   b. Administer calcium gluconate
   c. Administer insulin & glucose IV

3. **Severe (>7.0) or Moderate (6.0-7.0) with EKG changes:**
   a. The above treatments (dosages noted above) &
   b. Administer calcium gluconate
   c. Administer insulin & glucose IV
   d. Administer sodium bicarbonate IV

4. **Severe (>7.0) with EKG changes & instability or cardiac arrest**
   a. The above treatments
   b. Administer calcium gluconate. If there is a central line (not I/O), 1 gram (an amp) of calcium chloride (CaCl) can be given alternatively.

**Special situations:**
1. Acute Renal Failure:
   a. Monitor for ECG changes.
2. Patients with chronic renal failure on dialysis tolerate higher than normal potassium levels.
   a. Communicate with receiving facility to expedite process.
3. Hold kayexalate. There is limited data on its efficacy.
# Magnesium Derangements

**INDICATIONS:** Any patient for whom electrolyte replacement therapy has been initiated by the referring institution.

**MAGNESIUM ADMINISTRATION PROCEDURE:**

1. The patient’s urine output should be >20ml/hr. for at least 2 hours before using this protocol, unless otherwise ordered by the physician.
2. Cardiac monitoring is required during administration of IV magnesium to digitalized patients due to the risk of heart block.
3. IV magnesium mixture is not to be concentrated more than 1gm/100ml.
4. Consider the Magnesium at a rate no greater than 500mg/hr. in digitalized patients, due to the risk of heart block.
5. Hypotension can occur from rapid administration. During administration of IV Magnesium, monitor BP at least q 15 min. for the duration of the infusion. See protocol 4.12.
6. **Magnesium sulfate is available in varying strengths for parenteral administration.** Solutions should be carefully checked to verify that correct dosage is being administered. Solution Strength Magnesium Concentration Magnesium 10% 100mg/ml Magnesium 50% 500mg/ml
7. To make a 10% solution from a 50% solution:
   a. Take 4ml 50% Magnesium and dilute with 16ml D5 or NS.
   b. This results in 2gms Magnesium/20ml (or 100mg/ml)
8. Serum magnesium repletion.
   a. Magnesium should not be administered intravenously at rates greater than 125mg/min; except when administering for pre-eclampsia or for prevention of pre-term labor.
   b. Magnesium is contraindicated in patients with myocardial infarction or heart block, as it may slow cardiac conduction.
   c. Because of the CNS effects of magnesium, there may be interactions between magnesium and barbiturates, narcotics, hypnotics, or systemic anesthetics.
   d. Treatment of hypomagnesemia depends on the degree of deficiency and the clinical effects. Oral replacement is appropriate for mild symptoms, while IV replacement is indicated for severe clinical effects.
   e. Most patients with symptomatic hypomagnesemia and normal renal function, with an estimated deficit of 1-2mEq/kg should receive 1mEq/kg of magnesium sulfate for the first 24 hours as a continuous IV infusion.
   f. If cardiac dysrhythmias or seizures are present, infuse 2g magnesium sulfate IV push over 2 minutes.
CAUTION: The first sign of toxicity for a patient on a Magnesium Sulfate drip is the loss if depression of deep tendon reflexes. The Advanced Provider must monitor the patient throughout the transport for signs of toxicity.

<table>
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<th>Medical Transport, LLC</th>
<th>Policy Number: 4.10</th>
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<tr>
<td>Section/ Section Code:</td>
<td>Patient Care Guidelines (PCG)</td>
</tr>
<tr>
<td>Subject:</td>
<td>Creation Date: February 14, 2016</td>
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<tr>
<td>Hypocalcemia</td>
<td>Revision Date: July 6, 2018</td>
</tr>
<tr>
<td>Affected Departments: All Departments</td>
<td>Pages: 1</td>
</tr>
<tr>
<td></td>
<td>Effective Date:</td>
</tr>
</tbody>
</table>

INDICATIONS:
1. Any symptomatic patient presenting with an iCal value below 1.0.
2. Normal iCal is 1.19 to 1.29.
3. Be watchful for neurologic changes (Tetany, Chvostek's sign, etc.)
4. Patients with elevated K+ (see protocol 4.8)
5. Symptomatic magnesium overdose.

Pearls, Pitfalls, and Considerations:
Monitoring of iCal levels are of increased importance in patients receiving blood transfusions due to the Citric Acid preservative used in banked blood binding to calcium. Low calcium levels can exacerbate bleeding.

PROCEDURE:
1. In patients receiving large amounts of banked blood products, venous or arterial Ionized calcium levels will be monitored.
2. If indicated, consider Calcium gluconate 1g IV over 10 minutes.
INDICATIONS: Any patient with seizure activity or reported seizures prior to transport team arrival.

Pearls, Pitfalls and Considerations: Paralysis does not terminate the seizure, or its harmful consequences, from a cerebral standpoint.

PROCEDURE:

1. Establish and maintain adequate airway, oxygenation, and ventilation.
   a. Do not FORCE anything between the teeth.
   b. Suction as needed
2. Initiate or maintain IV of NS at TKO.
3. Obtain blood glucose level and treat appropriately. If fingerstick blood glucose is less than 60mg/dl, treat with:
   a. Dextrose 50% 25gm.
   b. 1mg of glucagon IM.
   c. Pediatrics: D25 0.5-1gm/kg
4. Consider Thiamine 100mg IV if suspicion of ETOH abuse.
5. Patient should be positioned in Lateral recumbent for the transport.
6. Monitor cardiac rhythm and vital signs with SPO2. ETCO2 recommended.
7. Watch for respiratory depression.
8. If the patient is actively seizing, consider the use of ONE type of benzodiazepine or as ordered by a physician.
   a. Lorazepam: 1.5- 2.0 mg IV push.
      i. Repeat twice as needed. Monitor for respiratory depression.
      ii. Pediatrics: 0.1mg/kg slow IV/IO/IM PRN. Do not exceed 2mg/dose. May repeat every 10-15 minutes
   b. Midazolam 1 – 2mg IV push or 10mg intramuscular (IM).
      i. May repeat for a total of 10mg.
   c. Diazepam 5-10mg IV/IO/IM/IN may repeat every 10-15 minutes. Max dose of 30mg in 8 hrs.
      i. Pediatrics: 0.05-0.3mg/kg every 15-30 minutes, max dose 10mg.
   d. Magnesium Sulfate: 1-2g IV if patient is pregnant

*Adults: Titration of all benzodiazepines to effect keeping SBP >100
**Pediatrics: Titration of all benzodiazepines to effect with SBP >70+(age in years x 2)
9. If seizures cannot be controlled or recur, request:
   a. Fosphenytoin - 20mg Phenytoin equivalents (PE)/kg not to exceed 150 mg PE/min.
      i. MAX dose 1500mg PE/kg
ii. Monitor for cardiac dysrhythmias and associated hypotension
b. Phenytoin – 20 mg /kg IV. Infusion rate should be 25mg/min.
   i. MAX dose 1500 mg
   ii. Monitor for cardiac dysrhythmias and associated hypotension
c. Consider use of Keppra for treatment and/ or patient has allergy to Fosphenytoin or continues to have seizures, administer:
   i. Keppra 20 mg/kg IV over 15 minutes
      1. MAX of 1g
      2. Note: There has been noted literature in the use of Keppra in the setting of Subarachnoid Hemorrhage (traumatic and spontaneous).
         Consult physician for option of this medication.
10. If intubated and BP allows, consider Propofol
    a. Bolus 1 mg/kg
    b. If MAP > 65, infusion with MAX dose 200 mcg/kg/min
11. The administration of phenobarbital or Propofol infusions have been shown to effectively suppress seizure activity. Consult with the physician. If staff is directed to administer these medications, endotracheal intubation is usually mandated. Refer to Protocol 2.3 and Protocol 2.4 for aggressive management of seizures post intubation, especially if long acting neuromuscular blockade is utilized.
8. Once seizures are terminated, examine patient for trauma and treat accordingly; in particular, examine for shoulder dislocation (usually posterior), and intra-oral injury.
9. Avoid systolic blood pressures less than 90mmHg and PaO2 less than 60.
10. If the blood pressure remains below 90 mmHg, consider aggressive fluid resuscitation of 30ml/kg or subsequent vasopressor therapy use. (Refer to Protocol 4.12).
INDICATIONS: The Advanced Provider will institute measures necessary for the stabilization and maintenance of ventilation and circulation in patients exhibiting signs and symptoms of shock.

Pearls, Pitfalls and Considerations:
1. Swan-Ganz catheter is very useful in treating shock. Document the balloons wedge, and the position of the catheter from the staff at the referring facility.

WARNING: The Advanced Provider should NOT obtain wedge pressures during transport. If needed, wedge should be obtained from a CCRN or above, familiar with the procedure and equipment.
2. Vasopressin and epinephrine can cause constriction of coronary vasculature, which may lead to cardiac ischemia. Vasopressin may be the only vasopressor that works reliably with a pH below 7.0. Phenylephrine raises SVR/Afterload without any beta stimulus, which may contribute to left ventricular workload.
3. A vasopressor/inotrope strategy that has been initiated prior to transport team arrival, which is proving effective and is physiologically appropriate, may be continued or modified based on physician orders.

Specific Physical Findings (All types of shock)
1. Mental status: Altered mental status, apathy, confusion, restlessness, mania
2. Pulse >120 or occasionally <40
3. BP: drop >15mmHg from lying or sitting or BP <80 systolic
4. Temperature: Hypothermia or Hyperthermia
5. Skin: Hyperemic, diaphoretic, cool or warm, color (pale, flushed, etc.)
6. Signs of trauma
7. Signs of pump failure: Hypotension, jugular venous distention in upright position. Wet lung sounds; peripheral edema (indicates chronic pump failure).

PROCEDURE:
1. Attempt to stop exsanguination if present
2. Lie patient down, legs elevated 10-12”, unless respiratory symptoms predominate or are aggravated by this. (If so, position patient in a position of comfort).
3. Request placing a radial or femoral arterial line by physician. Femoral line placement may be less difficult in the hypotensive patient. Titrate vasopressors and inotropes to MAP of 65.
4. Assess airway, breathing, and circulation.
   a. Ensure adequate oxygenation
   b. Administer high flow oxygen
   c. Begin continuous hemodynamic monitoring with cardiac monitor, non-invasive blood pressure monitoring
d. End-tidal CO2 monitoring.
5. Establish two large bore IV’s. If the patient has a central line, establish if the line is in the appropriate location and is patent.
6. If possible, determine Shock etiology.
7. Ascertain patient’s hydration status
   a. If the patient is not hydrated adequately, consider aggressive, but appropriate, fluid rehydration.
7. Shock and other altered hemodynamic states
   a. Distributive Shock (septic, neurogenic, anaphylactic; SVR below 800)
      i. Initiate Rapid Fluid Administration up to 30ml/kg. Monitor for respiratory distress.
      ii. Treat with appropriate protocol that addresses specific etiology of shock in conjunction with this protocol.
      iii. Therapies can include the following:
        1. Norepinephrine Infusion.
           1. Start at 0.05 mcg/kg/min. Titrate by 0.02 mcg/min as indicated
           2. Dose range: 0.05-0.5 mcg/kg/min.
           3. There is no true maximum dose, but consider additional agent if the patient is unresponsive to higher doses.
        2. If not effective, add Vasopressin 0.03 units/min
           a. It is important to note that typically vasopressin is held at a fixed rate (i.e. 0.03 units per minute as is not titrated).
        3. If above not effective consider Epinephrine infusion
           a. 0.05mcg/kg/min titrated for effect to MAX dose of 0.5mcg/kg/min
   b. Cardiogenic Shock: (CO below 3.5/CI below 2.0)
      i. Treat any rate/arrhythmia issue with appropriate Regional Protocol.
      ii. If known volume issue or in case of Right Ventricular MI, aggressively fluid hydrate patient.
      iii. Therapies can include:
        1. If unresolved, initiated Norepinephrine infusion
           a. Start at 0.05 mcg/kg/min. Titrate by 0.02 mcg/min as indicated
           b. Dose range: 0.05-30mcg min
              i. Pediatric dose is 0.05-0.1mcg/kg/min (Max dose of 2mcg/kg/min)
           c. There is no true maximum dose, but consider additional agent if the patient is unresponsive to higher doses.
        2. If unresolved, add Dobutamine 5-20mcg/kg/min to further increase CO/CI without reducing filling time and increasing tachycardia.
        3. If no response to any of the above, add Epinephrine Infusion
           a. 0.05mcg/kg/min titrated for effect
        4. Dopamine 5-20mcg/kg/min IV is the last adjunctive therapy that should be used for both chronotropy and inotropy.
   c. Hypovolemic Shock
i. Stop Bleeding. Utilize direct pressure and deploy tourniquet as needed.
ii. Initiated fluid challenge with 0.9% NS up to 30ml/kg. Target MAP of 60 - 65 and SBP of 80 to 90 mmHg.
iii. Refer to Protocol 7.1a for blood administration considerations
iv. If no response to above, initiate Norepinephrine Infusion
   1. Start at 0.05 mcg/kg/min. Titrate by 0.02mcg/min as indicated
   2. Dose range: 0.05-0.5mcg/kg/min.
   3. There is no true maximum dose, but consider additional agent if the patient is unresponsive to higher doses.
d. Shock of indeterminate etiology. (Hypotensive without a clear etiology)
i. Rapid Administration of isotonic fluid at 30ml/kg.
ii. Vasopressor therapy can include:
   iii. Norepinephrine Infusion
       1. Start at 0.05 mcg/kg/min. Titrate by 0.02 mcg/min as indicated
       2. Dose range: 0.05-0.5 mcg/kg/min.
       3. There is no true maximum dose, but consider additional agent if the patient is unresponsive to higher doses.
iv. If above therapy contra-indicated or unsuccessful and etiology of shock remains undetermined, consider Vasopressin 0.01 to 0.04 u/min IV (Typically, vasopressin is held at a steady dose at 0.03 units per minute).
INDICATIONS:
The Advanced Provider will institute measures necessary for the stabilization and maintenance of ventilation and circulation in patients exhibiting signs and symptoms of hypertensive crisis.

Pearls, Pitfalls and Considerations:
1. A hypertensive emergency occurs as a result of either an acute or chronic elevation in blood pressure resulting in significant end organ dysfunction.
2. Critical systems affected include central, cardiac, and renal.
3. It is imperative that the provider illicit a complete history including history of the current complaint, past medical history, and suspected or confirmed current diagnosis.
4. **THE GOLDEN RULE OF HYPERTENSION: TREAT THE PATIENT NOT THE BLOOD PRESSURE**

PROCEDURE:
1. Assess and monitor airway, breathing and circulation.
2. If patient has adequate spontaneous respirations, administer supplemental oxygen to maintain saturation between 94 - 99%.
3. Monitor cardiac functions (EKG, BP, P, and RR) and O2 saturations
4. TWO large bore IV’s of 0.9% Normal Saline.
5. Titrate medications below to targets outlined in individual guidelines for Non-Traumatic CVA, Aortic Dissection or Aneurysm
   a. Refer to guidelines 4.3, 4.4, and 4.5
6. Medications commonly used and encountered include:
   a. If HR > 60 and preferentially for Aortic Dissection
      i. **Labetalol**
         1. 10mg slow IV push
         2. May repeat 10-20 mg IV q10 minutes up to 200 mg until adequate BP is reached.
         3. May be given through peripheral line.
      ii. **Nitroglycerin**
         1. 5mcg/min continuous IV infusion increase by 5mcg/min every 3-5 minutes as needed up to 20mcg/min, then by 10 or 20mcg/min if needed. **Consultation should be obtained from physician.**
         a. Be cautious when lowering BP, as precipitous drop in BP can lead to stroke caused by vasospasm. Start with a very low dose, as patients may respond very quickly and drastically to nitrates.
ii. Lasix

1. 0.5-1.0mg/kg IVP if hypertension and signs/symptoms of CHF accompany the Hypertension. Monitor EKG closely while giving Lasix.

b. If HR ≤ 60 and preferentially for Aortic Aneurysm and CVA’s

i. Nicardipine (Cardene) Mix 25mg/250mL
   1. Initiate infusion 2.5 mg/hr.
   2. Consider increasing infusion at 5 – 10 minute intervals
      a. Increase infusion by 2.5 mg/hr.
   3. MAX dose 15 mg/hr.
   4. ONCE desired BP achieved, consider incremental dose reduction to lowest rate possible while still achieving desired SBP parameters, typically, this can be achieved at 3mg/hr.
   5. If hypertension persists, contact physician for other options
      a. Other possible alternatives:
         i. Esmolol (Brevibloc) Premixed 2500mg/250mL (10,000mcg/mL)
            1. Loading dose 1 mg/kg to MAX of 80mg over 30 seconds
            2. Initiate infusion at 150mcg/kg/min
               a. If HR drops below 60, reduce Esmolol infusion
               b. If Hypertension persists, add additional antihypertensive (Nicardipine infusion as below)
            3. Titrate by 50mcg/kg/min to desired HR of 60 – 70 and a MAX of 300mcg/kg/min
            4. Use extreme caution in asthmatics, diabetics, impaired renal function, or patient’s with a history of hypotension and CAD. May cause arrhythmia, angina, MI, or death if stopped abruptly. May cause hypoglycemia and mask the symptoms.

ii. Clevidipine

1. No loading dose
2. Initial infusion at 1-2mg/hr. Titrate 1-2mg/hr. q 5-10mins for therapeutic effect
3. Typical dosing is 4-6mg/hr.
4. Max dose 16mg/hr.
5. May be given through peripheral line.

iii. Hydralazine:

1. 10-20 mg slow IV push
2. May be given through peripheral line.

iv. Nitroprusside

1. Start infusion at 0.5mcg/kg/min.
   2. The infusion can be increased by 0.5 mcg/kg/min every 5 minutes until desired BP is reached or max dose of 10 mcg/kg/min.
Purpose: Described the appropriate and expected treatment of a patient with allergic reaction

Definition: Allergic reaction: Alert, Oriented, localized signs/symptoms, normotensive, skin warm/dry
Anaphylaxis: Multisystem reaction with signs of hypo-perfusion, and/or altered sensorium

Allergic reactions occur when a person’s immune system reacts to a normally harmless substance. Anaphylaxis is an immediate, life-threatening systemic reaction that can occur with exposure to a particular substance.

Specific Information Needed- History:

1. Known allergies,
2. Prior allergic reactions.
3. Exposure (skin contact, orally, IM /IV, etc.) during past few hours to allergenic substance, drugs, insect bites, toxic substances, or foods (nuts, fish & fruit most common).
   Exercise may also induce allergic reactions. Symptom Complaints:
1. Itching, difficulty breathing, chest tightness, nausea, abdominal cramps, subjective airway impairment or swelling, numbness and/or tingling.
   Acute Anaphylaxis can present with no rash or hives and consist only of cardiac instability Specific Physical Findings Possible:
1. Vital signs such as hypotension, tachycardia, tachypnea, increased temp, decreased SpO2, decreased ETCo2, decreased LOC.
2. Respiratory: Wheezing, hoarseness, upper airway noises, laryngeal edema, bronchospasm, cough.
4. Skin: Generalized itching or flushing, hives, angioedema.
5. Edema: Generalized or local; particularly lips, tongue, uvula, face
6. GI: Nausea, vomiting, diarrhea, abdominal pain, bloating.

Treatment Protocol:
1. Airway, Breathing, Circulation.
   a. Protect airway patency, suction as necessary.
   b. Administer high flow O2 at maximum FiO2.
   c. Remove offending agent, if still present.
   d. Monitor cardiac rhythm and SpO2 continuously.
   e. Patient should be in position of comfort if possible.
For Severe Allergic Reaction: systemic symptoms, any facial swelling, or airway involvement

a. **Epinephrine** (1:1000)
   i. Adult: 0.3mg IM/SQ (max dose 1 mg/kg). May repeat every 5-15 minutes
   ii. Pediatric: 0.01 mg/kg SQ every 3-5 minutes
   If bronchospasm:

b. Adult: **Albuterol** 5 mg Nebulizer treatment (Adult). Can repeat q 20 min x 3; Pediatric: **Albuterol** 0.15 mg/kg Nebulizer (max dose 5 mg). Can repeat q 20 min x 3

c. Initiate IV bolus of NS.

d. Adult: 250 cc, continue fluid resuscitation to maintain SBP > 90 mmHg.

e. Pediatric bolus 20 ml/kg NS times 2 then reassess for fluid overload.

f. If patient is in extremis, may give **Epinephrine** (1:10,000) IV/IO in 0.1 mg increments up to 0.5 mg.

g. If hypotension continues despite above treatment, consider infusion of **Epinephrine** (1:1000) GTT at 2-10 mcg/min.
   i. Initiate at 1 mcg/min IV. Double infusion every 2 minutes to effect.
   ii. Pediatric gtt. 0.1-1.0mcg/kg/min. 1.0mcg/kg/min maximum dose.

h. **Solumedrol**
   i. Adults: 125 mg IV/IO every 6 hours, if not already given.
   ii. Pediatrics: 1-2 mg/kg IV/IO.

For Mild Allergic Reaction:
   i. Administer **Diphenhydramine Hydrochloride (Benadryl)**
   ii. Adult 25-50 mg IV/IM/IO
   iii. Pediatrics: **Diphenhydramine Hydrochloride (Benadryl)** 1-2 mg/kg IV/IM/IO.

i. If no improvement: **Epinephrine** (1:1000) 0.1-0.15 mg/kg (max dose 1 mg/kg) IM/IV/IO. May repeat every 15 minutes x 2.
Medical Transport, LLC

Policy Number: 4.15

Section/Section Code: Patient Care Guidelines (PCG)

Subject: Sickle Cell/Thalassemia

Creation Date: February 14, 2016

Revision Date: July 6, 2018

Affected Departments: All Departments

Pages: 2

Effective Date:

Purpose:
The purpose is to describe the appropriate and expected treatment of the patient with Sickle Cell Disease or Thalassemia.

Policy:
Sickle Cell Anemia is a hemoglobin disorder present in about 8% of African American and sometimes persons of Mediterranean origin. The erythrocytes contain abnormally shaped hemoglobin. Sickling and hemolysis can occur during transport the crew will be prepared to give supportive care.

Specific Signs and Symptoms:
1. Palpitations: a frequent cardiac compensation for decreased oxygen delivery. 
   a. The heart adjusts to anemia by increasing its rate and stroke volume. Angina and CHF can occur.
2. Neuromuscular disturbances: patients experience headaches, dizziness, vertigo, fainting, and sensitivity to cold, tinnitus, muscular weakness and fatigue.
3. Gastrointestinal disturbances: patients with anemia are more prone to flatulence and should be observed carefully for gas expansion.
4. Crisis Symptoms include: nausea, vomiting, extreme joint pain, fever, and tachycardia; sense of impending doom, epigastric pain, and headache.

Treatment Protocol:
1. All patients who present with history of Sickle Cell Anemia, Thalassemia, or Sickle Cell trait will receive supplemental oxygen, to prevent any type of hypoxia, at least 2 lpm via nasal cannula.
2. Monitor patient’s cardiac and Sp02 continuously. Take NIBP’s q 15 minutes.
3. IVF 0.9% NS at 200 ml/hr to maintain hydration and provide access for IV pain control.
5. Monitor respiratory status carefully after narcotic administration.
6. For respiratory depression: Give Narcan if indicated.
**INDICATIONS**: Blunt or penetrating injury to the abdomen and fracture to the pelvis. The major immediate complications are hypovolemia and shock. The focus of this protocol will be the continuum of care.

**PROCEDURE**:

1. Complete primary assessment and manage airway, breathing and circulation.
2. If indicated, maintain standard spinal precautions.
3. Control any sources of bleeding identified during this assessment if not already initiated by the referring facility.
4. Titrate oxygen accordingly to maintain oxygen saturations between 94 - 99%. If the patient is intubated, do not wean FiO2 unless recent arterial blood gas has been completed.
5. Monitor and treat for hemorrhagic shock as appropriate.
6. Use permissive hypotension strategy as indicated.
7. TWO large bore peripheral IV’s of isotonic crystalloid solution to maintain MAP’s of 65 or greater. If patient is being transported from a community facility obtain and administer blood products, if available as determined by patient condition. If the patient has had adequate crystalloid volume resuscitation, consider utilizing packed red blood cells as outlined in Protocol 7.1a. If the patient has been receiving colloids from a sending facility, it reasonable to discuss the use of fresh frozen plasma with sending and receiving providers PROVIDED that it does not delay transport to the receiving facility.
8. Monitor closely for any changes in mental status, vital signs and/or impending profound shock. Early detection of signs of hemorrhagic shock and appropriate fluid administration can prevent or reduce the degree of shock. Keep in mind that intravenous volume administration may result in increased bleeding from intra-abdominal sources. If the source of bleeding is from a non-compressible site, judicious use of fluids may be wise.
9. Provide appropriate analgesia and or sedation as indicated. Refer to Protocol 6.3 Pain Control or Protocol 6.4 Sedation for the patient with anxiety or agitation (non-intubated). If the patient is intubated, refer to Protocol 2.4 Post-intubation sedation, pain control and paralysis
10. Assess for varying degrees of abdominal pain during a rapid but all-inclusive abdominal examination. Note Kehr’s, Murphy’s, Cullen’s or Grey Turner’s sign.
11. Spleen and liver injuries may lead to exsanguination immediately following the injury and therefore specific treatment should focus on hemodynamic status. IV fluids and/or blood products along with rapid transport should be considered
12. Any trauma resulting in hematoma formation to the male or female genitalia should be treated with ice, cold packs, and pressure dressings. Avoid placement of foley catheter in setting of severe perineal swelling or blood at the meatus.
13. When lacerations are present on male genitalia place wet saline dressings to area, if bleeding of the penis or scrotum is present, pressure dressings should be applied.
14. Vaginal bleeding should be observed, and a pressure dressing should be applied to the perineum when bleeding is profuse, and from a compressible source.
15. Fluid replacement requirements:
   a. Adults in hemorrhagic shock, crystalloid 30 mL/kg initial bolus.
   b. For pediatric patients refer to Protocol 8.4
16. Examine the abdomen for obvious wounds. Stabilize any impaled or penetrating object if not already completed by the referring facility. If the object cannot be stabilized appropriately, alternate form of transport must be utilized.
17. Consider occult intra-abdominal hemorrhage as part of differential diagnoses, especially in the presence of sustained tachycardia in the trauma patient. E-FAST ultrasound is an appropriate diagnostic (if available).
18. Assess for signs of exsanguination such as decreased LOC, pale, cool, clammy, diaphoretic skin, pale mucous membranes, delayed or absent capillary refill, distended rigid abdomen, shortness of breath and/or tachypnea, tachycardia and hypotension, unobtainable BP, BP that does not respond to fluid administration, and c/o of abdominal pain.
19. Consider NG tube. Patients being transferred from sending facilities who have suspected intestinal injury, gastric distention, or potential for aspiration should have an NG tube. In particular, patients with diaphragmatic rupture, GI tract injuries, and pregnancy should have an NG tube inserted prior to or in transport.
20. Consider foley catheter if no blood observed at urethral meatus.
21. Pelvic - Inspect perineum and buttock area, including anus for trauma. Achieve hemorrhage control.
22. If unstable pelvic fracture is suspected, apply pelvic binder (commercial device or sheet wraps). Identify appropriate position of pelvic binder over trochanteric heads. Avoid repeated assessments by manual compression of an unstable pelvis.
23. If the patient is an interfacility transport assess or obtain readings on abdominal films, Chest Radiograph for signs of free air or intra-abdominal bleeding. Assess for pelvic fractures on films and during complete examination.
24. Frequent and continuous monitoring of vital signs for developing signs of increasing shock and/or exsanguination.
INDICATIONS: Any patient with chemical, electrical, or thermal burns. Chemical decontamination MUST occur prior to transport.

PROCEDURE:

1. Stop the burning process and remove all clothing. Thoroughly rinse chemicals off with water, with the exception of powdered chemicals, which should be brushed off.
2. Conduct primary assessment and ensure adequate ABCs. Any life threatening problems identified will be immediately treated.
3. Thorough assessment of respiratory status of patients with facial, neck and chest burns. Early intubation is often indicated for:
   a. Severe burns of the face and/or neck.
   b. History of confinement in burning environment.
   c. Carbon deposits in the oropharynx or nares in conjunction with hoarseness, stridor or some other tangible evidence of suspicion for airway injury
   d. Facial and neck edema, such injuries require prompt intubation or possible cricothyrotomy.
   e. If intubation is required it must be performed early on in the course of care because it may prove to be impossible with the onset of edema after the initiation of fluid replacement.
4. If the patient is intubated, refer to Protocol 2.4.
5. If patient has adequate spontaneous respirations, administer supplemental oxygen to maintain SpO2 > 95%. Consider providing 100% via NRB due to concerns of CO poisoning.
6. If bronchospasm is present, consider the administration of Albuterol. Refer to Protocol 2.5
7. Assess for mechanism of injury; include any potential trauma and circumstances surrounding the burn injury. Treat for signs and symptoms of concurrent significant blood loss and impending hypovolemic shock.
8. Consider placement of Foley catheter for continued monitoring of urine output.
9. Assess for area and degree of pain.
10. Assess for circumferential burn injury and distal pulses, motor and sensation to the injury.
11. Calculate % TBSA burned of superficial, partial, and full thickness burns. In estimating scattered burns, a fairly accurate approximation can be made utilizing the patient’s palm to represent 1% of the total BSA and visualizing palm over the burn area. (Refer to #25 for Rule of 9’s).
12. Obtain or estimate weight.
13. A minimum of 2 large bore IV’s (Use 0.9% Normal Saline), preferably outside burned area. Avoid over-hydration.

15. Thermal burns:
   a. Fluid resuscitation as needed for other acute trauma
   b. Burn fluid (based on Parkland formula) ml per hour = 0.9% Normal Saline at 4 ml/kg X %BSA.
      i. Administer ½ of Parkland calculated fluid in the 1st 8 hrs. Then administer the remaining ½ over the next 16 hrs.
   c. Maintenance fluids:
      i. For pediatric patients, maintenance fluids with dextrose (D5 NS) must be calculated and administered in addition to Parkland fluids

16. In the absence of significant non-burn related trauma, transport to burn center if:
   a. >20% partial thickness burn in pts 10-50 years old.
   b. >10 % partial thickness burn in pts >50 years old or <10 years old.
   c. >5% full thickness burn in patients of any age.
   d. Burns of hands, face, genitalia, feet, or joints.
   e. Inhalation injury.
   f. Chemical or electrical burns.
   g. Circumferential burns of an extremity.
   h. Burns on patients with pre-existing medical illnesses.
   i. Burn injury that requires long-term rehabilitative support, and special social/emotional support.

17. Electrical burns:
   a. Initiate crystalloid infusion at 500ml/hour to achieve urine output of 75-100ml/hour, titrate to maintain urine output of 75-100ml/hour.
   b. Patient is at risk for acute renal failure with these burns (With concurrent rhabdomyolysis). Consider initiating sodium bicarbonate drip.
      i. Sodium Bicarbonate 150mEq in 1 liter of D5W @ 250 ml/hr.
   c. Electrical burn patients should be monitored for life threatening dysrhythmias.
   d. Full spinal immobilization should be considered if indicated.
   e. Check for entrance and exit wounds.


19. If circumstances indicate closed space exposure, carbon monoxide poisoning may coexist with other trauma and burns. High flow O2 should be provided. If patient is unconscious, intubation and administration of 100% Fi O2 should be initiated. CO level should be obtained, if possible.

20. Assess and treat the burn itself.
   a. Superficial (erythema only)
   b. Partial thickness (blistered)
   c. Full thickness (charred areas)

21. If burns are not dressed, cover with clean dry sheet.

22. Cover facial burns with dry sterile dressing. Avoid moist dressings.

23. Eye (corneal burns) - irrigate with 500-1000ml NS.

24. Rule of Nine’s
   a. Head and neck = 9%
b. Each upper limb = 9%
c. Each lower limb = 18%
i. Anterior 9%, Posterior 9%
d. Torso = 36%
i. Anterior 18%, Posterior 18%
e. Perineum = 1%
f. Palm area is roughly 1% of their total body surface area
<table>
<thead>
<tr>
<th>Damage to the outer layer of skin (epidermis), causing pain, redness and swelling.</th>
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<tbody>
<tr>
<td>Damage to both outer skin and underlying tissue layers (epidermis and dermis) causing pain, redness, swelling and blistering.</td>
</tr>
<tr>
<td>Damage extends deeper into tissues (epidermis, dermis and hypodermis) causing extensive tissue destruction. The skin may feel numb.</td>
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INDICATIONS: Any patient exhibiting signs and symptoms of blunt or penetrating trauma.

PROCEDURE:
1. Perform primary assessment and identify critical injuries to the respiratory and circulatory systems. If airway compromise is identified, refer to Protocol 2.3.
2. Oxygen as indicated by patient condition. Administer supplemental oxygen to maintain SpO2 >95%
3. Identify and stabilize any penetrating objects to the chest.
4. Control hemorrhage by direct pressure and/or Hemostatic Gauze.
5. Treat for shock as appropriate. Use permissive hypotension strategy. Maintain MAP of 60-65.
6. Establish TWO large bore peripheral I.V.’s of isotonic crystalloid solution.
7. If the team is completing an interfacility transport, assess initial chest radiograph for signs of hemothorax or pneumothorax as well as patient assessment and respiratory status.
8. If chest tube is in place with either chest drainage unit or Heimlich valve, confirm position and function of system before departure. When feasible, maintain active suction to the closed system.
9. Monitor hemodynamic status including heart rate, blood pressure, oxygen saturations and end tidal carbon dioxide.
10. Consider NG tube.
11. Observation of clinical signs of an open pneumothorax require immediate placement of a sterile occlusive dressing, large enough to overlap the wound edges, that is taped securely on three sides. If signs of a tension pneumothorax develop, release occlusive dressing before performing needle thoracostomy.
12. If a closed pneumothorax is diagnosed, chest tube placement should be strongly considered prior to transport to avoid an increase in size of the pneumothorax. The risk of this delay must be considered in relation to the risk of deterioration of the patient.
13. Provide appropriate analgesia. Refer to Guidelines 6.3 and 6.4.
14. If trauma is a penetrating wound to the chest, consider requesting administration of antibiotics.
15. For known or suspected great vessel traumatic injury (Aorta, vena cava, and pulmonary artery), provide adequate pain and management. Recognize that the effects of intubation and positive pressure ventilation can increase intrathoracic pressure.
16. In the setting of crush syndrome of the thorax (traumatic asphyxiation), staff must be able to identify injuries to the critical systems and be prepared to address these injuries immediately. Airway management must be addressed with high flow oxygenation to maintain oxygen saturations greater than 95%. A thorough respiratory assessment must ensue as described above. Lung decompression may be indicated if there is evidence of hemothorax or...
pneumothorax. If the patient is in cardiac arrest, please refer to Protocol 5.6 “Acute Resuscitation Multisystem Unstable Adult Trauma Patient” for further interventions.

16. In patients with crush syndromes to the thorax, provide intravenous fluids of 0.9% Normal Saline. Repeat 0.9% Normal Saline. If there is concern for acute decompensation secondary to metabolic acidosis (i.e. prolonged compression) after release, consider alkanize
INDICATIONS: Any patient who has sustained a head injury who presents with an altered level of consciousness, or has a history of unconsciousness following injury.

Pearls, Pitfalls and Considerations:
Consider early intubation because of the risk of deterioration during transport
Maintain Cerebral Perfusion Pressure

PROCEDURE:

1. Conduct primary assessment, assure adequate ABC’s. Any life-threatening injury should be treated immediately. If there is evidence of significant external blood loss, control bleeding.
2. If patient has adequate spontaneous respirations, administer supplemental oxygen to maintain SpO2 of 94-99%.
3. Assess for Intracranial injury including evidence of altered mental status (GCS of less than 9, evidence of Cushing’s Triad or other evidence of rising intracranial pressure. If these signs and symptoms are present, consider performing a neuroprotective intubation. Refer to Protocol 2.3
4. Initiate and maintain full spinal immobilization as indicated. Note and document if there is spontaneous movement of all extremities
5. If mechanically ventilated, maintain ETCO2 35-40 mmHg, until pCO2 is measured and then trend pCO2.
6. Place patient in reverse trendelenburg, elevate head of bed 15 to 20 degrees. Maintain spinal precautions if indicated.
7. IV access and infuse 0.9% Normal saline at maintenance rate unless hypoperfusion or other injuries dictate another rate. Contact physician if greater than 2000ml of crystalloid has been infused to maintain perfusion.
8. For patients with evidence of herniation
   a. Unilateral pupillary dilation
   b. Rapidly decreasing LOC
   c. Decorticate/ decerebrate posturing
   d. Increase the ventilator rate sufficient to decrease ETCO2 to at least 35 mmHg, correlating to a pCO2 of 35 as soon as possible
9. With GCS <8, profound coma or deterioration of consciousness and/or signs of increasing ICP.
   a. Hypertonic Saline 3%  
      i. 250ml Bolus through central or large peripheral line over 20 mins
      ii. ONLY for patients with signs of imminent herniation or progressive neurologic deterioration
   OR
   b. Infuse Mannitol
i. 0.25 to 1gm/kg of 20% solution IV over 20.
ii. Use **ONLY** for patients with signs of imminent herniation or progressive neurologic deterioration with a MAP of 70

10. Treat associated problems:
   a. Cervical spine precautions
   b. Treat seizures per protocol (Protocol 4.11: Seizure Management)
   c. Dress open wounds as necessary per standard BLS management. If bleeding continues, use of Hemostatic gauze.
   d. Sedate as necessary. Aggressively treat perceived pain.
   e. **Protocol: 6.3** Pain Control.
   f. **Protocol: 2.4** Post intubation: Sedation, pain control, and paralysis.

11. Intermediate-duration neuromuscular agents may be used after sedation for intubated patients that are resisting the ventilator or agitated and have signs of increasing ICP.


13. Consider Foley and orogastric tube in intubated patients.

14. Treat with fluids in the presence of shock state. Maintain Systolic BP greater than 90mmHg and a MAP >60 for optimal cerebral perfusion.

15. Cerebral perfusion pressure is the mean arterial blood pressure minus the intracranial pressure \( CPP = MAP - ICP \).

16. Continually reassess for changes in hemodynamics and neurologic status.
INDICATIONS: Any patient with suspected or known spine injury.

**Pearls, Pitfalls and Considerations:** Removal of spinal immobilization for patient with “negative” spine injury, per protocol, may require specific communication and interactive skills for non-English speaking or pediatric patients.

Cervical spinal cord injury patients have compromised respiratory function and may deteriorate enroute. Consider pre-transport intubation. If a cervical collar has been applied, transport with collar in place. If a cervical collar is not in place, then patient must have met the Spine Injury Protocol requirements. (Tidewater EMS Guidelines as outlined, or been able to provide a reliable exam and had their “positive spine injury” ruled out with a full series of C-spine films/CT’s, including flexion and extension films if they have spine pain/tenderness. If uncertainty exists regarding C-spine status, apply/reapply collar for transport).

**PROCEDURE:**

1. Complete primary assessment to evaluation for critical injuries affecting airway, breathing and circulation. Simultaneously, protect spine (cervical, thoracic and lumbar regions) with appropriate immobilization if required based upon clinical presentation and mechanism of injury.
2. Initiate oxygen therapy to maintain oxygen saturations between 94 - 99%.
3. Note and document any gross neurologic deficits prior to immobilization.
4. Document levels of sensory and motor function.
5. Assess for soft tissue injury, swelling, bony crepitus, pain, deformity, muscle spasm.
6. Assess movement, sensation, and strength of extremities
7. Immobilize patient on backboard with straps and immobilize neck with cervical collar if indicated.
8. IV access, NS at maintenance rate or as dictated by perfusion or associated injuries.
9. Consider NG tube.
10. Consider Foley catheter at referring facility if spinal cord injury is evident or there is known spinal column injury.
12. Be alert for occult trauma to head, chest, abdomen, including pelvis. Refer to Protocol 5.6 for traumatic arrest
13. Interfacility Transfers:
   a. The use of a spine backboard can still be used as a transportation device at the discretion of the Advanced Provider, but shouldn’t routinely be used.
   b. Care should be taken to effectively pad and fill voids to minimize injury and patient comfort during transport.
14. Treat pain and anxiety per Guidelines 6.3 and 6.4.
INDICATIONS: To identify and prioritize goals of resuscitation of the unstable / peri-arrest trauma patient.

Pearls and Pitfalls and Considerations: In many of the individual guidelines in the trauma section, attention has focused on individual areas of injury. It is important to note that there is a small population who present with significant hemodynamic instability and high potential for high morbidity and mortality.

1. As advanced providers, it is important to have a defined systematic approach to identify and prioritize areas of compromise in order to guide the resuscitation rather than specific diagnoses.
2. These patients who are physically unstable are rapidly progressing to an arrest state if not treated appropriately.
3. It is up to the providers to initiate rapid interventions to arrest this progression.
4. This Protocol will attempt to outline key components of the resuscitation required to stop further decline.

PROCEDURE:
Note: Like many resuscitation techniques, Medical Transport, LLC continues to emphasize resuscitation strategies based upon well-defined guidelines of traditional techniques with incorporation of newer evidence based ideas and technology. This protocol will outline these below.

1. Initiate primary assessment and identify critical injuries to the respiratory system. Maintain oxygenation with supplemental oxygen to maintain saturations between 94 - 99%. If airway compromise is identified, refer to Protocol 2.3. Consideration of the comorbidities and concurrent injuries of the patient must be maintained.
2. Patients with potential intracranial pathology, suspected concurrent spinal trauma, and those with a contraindication to succinylcholine and other RSI medications must be identified and treated.
3. Prior to placement of a definitive airway, staff must consider those patients who may have distorted anatomy or will have a potentially difficult airway when placement is attempted. Back up airway devices and needle/ surgical cricothyrotomy techniques may be required Guidelines 7.8 and 7.9.
4. Confirmation of definitive airway placement can occur with physical exam, capnography, imaging (chest x-ray) and thoracic ultrasonography (i.e. E-FAST) if available.
5. In the primary assessment, providers must observe for external injuries such as open wounds, leaking air and chest wall deformity. Additional, physical signs must be identified including: crepitus, deformity and asymmetric respiratory motion. Breath
sounds must be auscultated in both the apical and lateral chest areas. Lastly, the sonographic E-FAST can be useful as an imaging tool in the out-of-hospital environment for identifying occult intrathoracic pathology (if available). If injuries are detected including tension pneumothoraces, massive hemothoraces, cardiac tamponade and flail chest. Each of these diagnoses must be addressed immediately Protocol 5.3

6. If a patient presents in cardiac arrest after blunt or intrathoracic penetrating trauma, needle thoracostomies should be considered if there is suspected evidence if injury.

7. In addition to the noted respiratory compromise, intrathoracic trauma can lead to circulatory failure due to both hypovolemia and distributory shock due to impeded blood flow secondary to a tension pneumothorax.

8. When patients have circulatory compromise, treatment should be initiated even if a specific source is not readily identified. Basic physical exam in conjunction with basic diagnostics if available should be used including (chest and pelvis radiographs and E-FAST ultrasound).

9. If a patient has presented with circulatory collapse with noted cardiac arrest after blunt or penetrating chest trauma, the Advanced Provider should consider the use of ultrasound for the identification of cardiac tamponade.

10. In those patients who have been identified to have failure of tissue and cell oxygenation, resuscitation strategies remain controversial and no specific guideline exists. Resuscitation efforts should focus on physiologic markers (urine output, mentation, etc.) rather than specific vital signs. Standard techniques focus on a 1 to 2 liter infusion of IV Fluids with rapid progression to colloid blood products soon after to improve oxygen delivery to the appropriate tissues.

11. Large bore intravenous lines or Central lines continue to be the mainstay for medication therapy or fluid infusion. If central or peripheral access cannot be obtained, the Advanced Provider should consider the use of intraosseus access with the EZ I-O.

12. Bleeding control, both internal and external, must be part of the treatment of the initial assessment with the use of alignment of long bone fractures, the use of hemostatic gauze, stapling, and pelvic binder in patients with open book pelvic trauma. The combination of these techniques with aggressive resuscitation measures may keep patients from progressing with further injury due to hypovolemia.

13. With those patients with concurrent multisystem trauma with concurrent head injury, special care must be instated to minimize episodes of hypotension to avoid secondary injury. Those patients with severe brain injuries, a single episode of hypotension doubles overall mortality of these patients. Continued resuscitation efforts are the mainstay of treatment and maintaining a systolic blood pressure greater than 90 will concurrently maintain a cerebral perfusion pressure of 50 to 150 mmHg.

14. It is essential to note that resuscitation techniques must focus on identifying the injuries that are not only affecting the patient currently as well as additional potential injuries that may have a delayed effect. Treatment must focus on arresting further bleeding and decompensation. Management of the unstable trauma patient utilizes a variety of resuscitation techniques, but standard Regional Guidelines should only be utilized in identified patients and not the standard of care in all trauma patients.

**NOTE:** It is essential to note that resuscitation techniques must focus on identifying if possible the injuries that are not only affecting the patient currently as well as additional potential injuries that may have a delayed effect. Treatment must focus on arresting further bleeding and decompensation. Out of
Hospital Management of the Unstable Trauma Patient utilizes a variety of resuscitation techniques, but Regional guidelines (i.e. Advanced Cardiac Life Support) should only be utilized in identified patients rather than the standard of care.

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**Alcohol Emergencies**

**Subject:** Alcohol Emergencies

**Creation Date:** February 14, 2016

**Revision Date:** July 6, 2018

**Affected Departments:** All Departments

**Pages:** 2

**Effective Date:**

**INDICATIONS:** Any patient experiencing some or all of the following symptoms resulting from cessation of habitual alcohol intake: Malaise, tremulousness, sweating, agitation, elevated blood pressure, hallucinations, tachycardia, hyperthermia, cardiovascular collapse, and seizures. Providers are reminded that both Delirium Tremens (DT’s), which can cause altered mental status and withdrawal seizures can occur six to 24 hours after the last alcoholic drink.

**Pearls, Pitfalls and Considerations:**

1. Trauma, communicable disease and alcoholism are frequently companions. Other significant comorbidities may exist.
2. If possible, determine when the patient last consumed alcohol and the quantity. Identify if the patient has had significant sequelae from alcohol use or withdrawal including seizures and delirium tremens in the past.
3. If the patient has a seizure, refer to Protocol 4.11 for detailed management. Any significant simple or complex partial seizure is NOT alcohol related. The patient requires further investigation of the etiology of the seizure (i.e. head CT).
4. Determine if there are significant co-ingestants or other types of toxic alcohols consumed (i.e. Ethyl alcohol, ethylene glycol, methanol and others)
5. If an alcohol level has been drawn, most patients will metabolize the alcohol based upon zero order kinetics at 25mg/dl/hr.

**PROCEDURE:**

1. Establish and maintain an adequate airway and ventilation. Assess for trauma concurrently.
2. Monitor EKG, end-tidal CO2 and O2 saturations.
3. If the patient has altered mentation, complete Fingerstick blood glucose. If blood glucose level <60 mg/dl, administer 25g of **D50, 100ml of D10** or consider the use of **Glucagon** 1mg IM.
4. Initiate IV access and provide 0.9% NS to achieve adequate hydration, unless patient has a history of congestive heart failure, renal failure, or is in pulmonary edema bolus with 500 ml NS and maintain at 200 ml/hr.
5. Maintain NPO status during patient care.
6. If the patient has a long history of alcohol use, consider the use of Thiamine 100mg IV or IM prior to providing dextrose if possible. Do not withhold dextrose if unavailable.
7. Administration of Lorazepam for tremulousness with or without behavioral agitation and seizures. Use caution in patients who are heavily intoxicated or have current head injuries.
   a. **Lorazepam** 1-4mg IV/ IM/ PO as indicated. In cases of status epilepticus: May repeat at 10 -15 minutes if the patient has persistent seizure activity:
   b. **Midazolam** 0.5-2mg IV/IO not to exceed 10mg.

8. Most patients who experience alcohol withdrawal seizures will not seize after the administration of appropriate doses of benzodiazepines. Refer to Protocol 4.11.

9. If the patient becomes lethargic after benzodiazepine administration, consider airway protection – Protocol 2.3.

10. Restrain if needed to provide a safe transport for the patient and team. If the patient is considered unsafe, if appropriate, provide airway protection including rapid sequence intubation.

11. Toxic Alcohols
   a. There are a number of toxic alcohols that require consideration in the intoxicated patient including:
      i. Isopropyl Alcohol
      ii. Methanol
      iii. Ethylene Glycol
Medical Transport, LLC

Policy Number: 6.2

Section/Section Code:
Patient Care Guidelines (PCG)

Subject: Behavioral Emergencies
Creation Date: February 14, 2016
Revision Date: July 6, 2018

Affected Departments: All Departments
Pages: 1
Effective Date:

INDICATIONS: Any patient who demonstrates restlessness, agitation, confusion or potentially violent behavior regardless of underlying diagnosis. The Advanced Provider will assess the patient and take appropriate measures to sedate and restrain the patient prior to and during transport to ensure a safe and secure environment.

Pearls, Pitfalls and Considerations: Remember that agitation may signal a physiologic deterioration of the patient and accompany hypoxia, hypoglycemia, cerebral edema, etc. If behavior compatible with safe transport cannot be achieved or predictably maintained, consult with the referring physician prior to transport.

PROCEDURE:
1. Assess mental, emotional, and physical status thoroughly prior to departure.
2. Anticipate changes in attitude and behavior of patient.
3. Maintain calm demeanor and environment; give explanations to patient as appropriate.
4. Establish intravenous access. If there is potential for agitation, make additional attempt to secure IV access (i.e. Cling, bandages, etc.).
5. Attend to concurrent medical or trauma needs as per protocol (Remember - changes in behavior may have a physiologic or pharmacologic explanation).
6. Medicate confused/combative patients as needed. See Protocol 6.4
7. Insure that patient is not carrying weapons or other items that may be used as such (e.g. ballpoint pens).
8. If patient continues to demonstrate aggression or combativeness and is deemed a risk to crew or to the transports safety, the crew should:
   a. Talk down techniques should be enacted
   b. If talk down was unsuccessful, utilize the appropriate level of restraints to prevent injury of the patient, and harm to crewmembers.
      I. Ongoing assessments should be performed assessing the patient’s CMS q 15 minutes.
   c. When additional attempts have been employed, the patient should be sedated. Refer to Protocol 6.4. Sedation of a non-intubated patient.
INDICATIONS: Any patient with pain due to injury or illness. Pain is a subjective symptom in which the patient exhibits a feeling of distress and discomfort caused by stimulation of certain nerve endings related to their illness/injury.

PROCEDURE:
1. Manage pain aggressively
2. Titration over brief time periods is preferable to hourly, interval dosing as a means of achieving patient comfort
3. Remain alert to complications and side effects
4. Maintain adequate airway, breathing and circulation.
5. Administer O2 as indicated to maintain oxygen saturations between 94 - 99%
6. Monitor hemodynamics including pulse, blood pressure, respiratory rate, ETCO2, and oxygen saturation.
7. Assess and document a patient’s level of pain upon patient contact, at least every 10 minutes to coincide with the assessment and documentation of patient vital signs, and after any intervention that is performed to relieve pain. Pain shall be documented in the patient chart where the numerical pain value is to be charted.
8. Assess patient for reports of pain using an objective scale (Numerical such as 1 to 10 or Wong-Baker FACES scale as developmentally appropriate). In cases where a patient is unable to verbalize their pain, a pain assessment tool such as the adult nonverbal pain scale should be used.
9. For pain unrelieved by other interventions
   a. **Fentanyl**
      i. Adult: 1 to 3 mcg/kg IV PRN. Titrate to pain control, wakefulness, and airway protection.
   b. **Fentanyl Infusion**
      i. 25 to 250 mcg/hr. Request for longer interfacility transport of intubated patients.
   c. **Morphine Sulfate**
      i. Adult: 0.05 mg/kg to 0.1mg/kg IV PRN pain. Titrate to pain control, wakefulness, and airway protection.
   d. **Morphine Sulfate Infusion**
      i. 0.5mg- 20mg/hr. Request for longer transports. Titrate to effect.
10. Have **Naloxone** 0.04 to 2.0 mg IV available to treat respiratory depression (RR <10/minute) or signs of narcotic overdose.
11. If patient has been successfully medicated at referring hospital, continue medication enroute. Consult with referring physician.
12. Nausea – Zofran 4mg IV push. For persistent nausea/vomiting may repeat q 20-30 minutes PRN up to 8 mg IV.

   a. Contact physician early for treatment options and subsequent analgesic dosing of Ketamine
   b. Use with caution in patients with coronary artery disease, hypertension, tachycardia, psychosis, and elevated ICP.
   c. Side Effects are not common with low dose ketamine infusions.
   d. Adverse effects that have been reported, typically at higher doses include: hypertension, tachycardia, tremors, tonic-clonic movements, fasciculations, increased intracranial pressure, hypersalivation, vomiting, increased skeletal tone, diplopia, nystagmus, increased intraocular pressure, increased airway resistance, and depression of cough reflex.
   e. Reassure patients (especially non-communicative patients) that they may experience a dream like feeling.
   f. Infuse through dedicated IV line (when possible) or via the most proximal port of a carrier solution.
      i. Ondansetron 0.1mg/kg, if NOT given within previous 30 minutes
         1. MAX dose 8mg
      ii. Ketamine
         1. Mix desired dose in 10mL syringe and administer over 1 – 2 minutes
            a. Rapid administration can cause nausea and apnea
         2. Advise patient to mentally model a pleasant thought
         3. BOLUS 0.1 – 0.3 mg/kg
            a. MAX dose 30 mg
            b. May also initiate infusion after bolus dose
         4. INFUSION 0.05 – 0.2 mg/kg/hr
            a. MAX dose 20 mg/hr
         5. Although dissociative doses are usually in excess of 0.5 mg/kg, If patient does not require airway management, but becomes agitated during emergence from effects, consider
            iii. Versed 0.01 mg/kg
                1. MAX dose 1mg
INDICATIONS: Any non-intubated patient with anxiety or otherwise in need of sedation

Procedure:

1. Manage patient aggressively
2. Titration over brief periods is preferable to hourly interval dosing as a means of reducing anxiety
3. Remain alert to complications and side effects.
4. Evaluate for any underlying medical cause that can be causing the anxiety, i.e. hypoxia, hypoglycemia, toxic ingestion, closed head injury, etc.
5. Identify changes in vital signs that may indicate that the patient is experiencing anxiety or agitation before significant sequelae occur.
6. Monitor airway, breathing and circulation
7. Administer O2 as indicated
8. Monitor hemodynamics including EKG, pulse, blood pressure, ETCO2 and O2 saturation.
9. Assess and treat pain (See Protocol 6.3 Pain Control Protocol)
10. For anxiety or agitation unrelieved by other interventions, administer the following medications.

11. For agitation causing acute deterioration or safety hazard administer:
   a. **Midazolam**: 1 to 5 mg IV every 5 minutes as needed.
   b. **Lorazepam**: 1 to 4 mg IV; may repeat q 15 minutes.

12. For anxiety unrelieved by benzodiazepines, hemodynamic instability, or concerns for depressing respiratory drive with benzodiazepines:
   a. **Discuss with physician early for treatment options and subsequent sedative dosing of Ketamine**
   b. **Ketamine** 0.3 mg/kg
      i. MAX dose 30mg
      ii. If possible, administer over 1-2 minutes, but it is noted this dose may be administered rapidly, potentially causing apnea and vomiting, be prepared to support and/or manage the airway
      iii. Although dissociative doses are usually in excess of 0.5 mg/kg. If patient does not require airway management, but becomes agitated during emergence from effects, consider:
         1. **Versed** 0.01 mg/kg
            a. MAX dose 1mg

13. If patient has been successfully sedated at referring hospital, obtain and continue medication en route.
INDICATIONS:

1. **Adult** patients eligible for blood administration are those who have a history of obvious or suspected acute blood loss, who have had crystalloid fluid resuscitation with 2 liters of NS, and who demonstrate:
   a. SBP less than 90mmHg
   b. Clinical signs of shock (alt. mental status, tachycardia, pallor, delayed capillary refill etc.)

2. Pediatric patients eligible for blood administration are those that have had crystalloid fluid resuscitation of 2 boluses of 20ml/kg with a history of obvious or suspected acute blood loss, and/or who demonstrate persistent signs of clinical shock (alt. mental status, tachycardia, pallor, delayed capillary refill etc.)
   a. Pediatric patients should receive blood transfusions of 10ml/kg, incrementally, as needed;
      i. Maximum of 40 ml/kg should be transfused in this situation.

PROCEDURE:

1. **Equipment**
   i. Physician orders
   ii. Blood product, typed and cross matched (in some cases may be cryoprecipitate, platelets, or plasma)
   iii. Dedicated venous access line (18 g or larger needle)
   iv. Filtered administration set
   v. Normal saline solution
   vi. Thermometer

2. **Complications**
   i. Anaphylaxis
   ii. Hemolytic reactions
   iii. DIC
   iv. Transfusion reaction
   v. Infection

3. **Signs of complications**
   a. Body temperature of 2 degrees F or more above the baseline temperature
   b. Hives, itching, or skin symptoms
   c. Swelling, soreness, or hematoma at the venous site
   d. Flank pain
   e. Tachycardia
f. Respiratory distress  
g. Hypotension  
h. Bleeding from widely varied sites or previously clotted wounds  
i. Blood in urine  
j. Anaphylaxis  
k. Nausea and vomiting  

**URGENT!** If a transfusion reaction is suspected, stop transfusion immediately and present suspect blood unit and tubing to receiving facility for testing. Refer to other appropriate guidelines such as: anaphylaxis, pulmonary edema, shock. If a suspected transfusion reaction has occurred, notify base hospital blood bank as soon as possible upon completion of transport, and complete transfusion reaction form.

4. Steps: If you are to start a blood product provided by the transferring facility;  
a. Prior to leaving the transferring facility, physically look at the product with the transferring nurse and confirm you have the correct product for the right patient. Review the order with the nurse.  
b. All products must be administered via an IV Pump  
c. Re-confirm the order or protocol prior to administering  
d. Check the patient for the following: Right patient, blood product, and right type. Have a second provider confirm steps c and d with you.  
e. Assess the baseline vital signs  
f. Ensure suitable venous access (usually requires 18 g or larger).  
g. Check the blood for the following: Right patient, right blood product, right type, and expiration date.  
h. Assess the patient for the possibility of a transfusion reaction, and consider prophylactic administration of ibuprofen or acetaminophen and diphenhydramine  
i. Maintain temperature of the blood product  
j. Flush the primary tubing with normal saline  
k. Cover the administration filter with blood  
l. Connect the blood tubing  
m. Piggyback into the IV line with normal saline  
n. Start the transfusion slowly  
o. Monitor the patient **every 5 minutes** for adverse reactions  

Note:
- DO NOT mix blood with 5% dextrose in water as this causes hemolysis  
- DO NOT mix blood with Lactated Ringers as this causes clotting  
- DO NOT mix blood with medications as this may cause a reaction  
- Have a second access site available
PURPOSE: To identify the various type of transfusion reactions and how to manage them.

PROTOCOL: Types of reactions with signs and symptoms and treatment guidelines: If it is unclear what type of reaction the patient is having, stop the transfusion, keep vein open with normal saline, contact the physician for guidance.

1. Allergic reaction (mild); sensitivity to infused plasma proteins (severe): antibody – antigen reaction
   a. S/S (mild): chills, facial and laryngeal edema, pruritus, urticaria, and wheezing; SS (severe): Dyspnea, chest pain, circulatory compromise, cardiac arrest
   b. Treatment:
      i. Stop the transfusion. Disconnect the blood administration set from the adapter or hub of venous access
      c. Keep vein open with normal saline
      d. Monitor vital signs
      e. Consult with physician
      f. Follow Regional allergic reaction protocol.

2. Bacterial contamination: Contaminated blood administration
   a. S/S: chills, vomiting, abdominal cramps, bloody diarrhea, hemoglobinuria, shock, renal failure and DIC
   b. Treatment
      i. Stop the transfusion, Disconnect the blood administration set from the adapter or hub of venous access
      ii. Keep vein open with normal saline
      iii. Hold and send the remaining blood to a laboratory (at the receiving hospital if in transit or at the transferring hospital)
      iv. Administer IV fluids to maintain SBP >90
      v. Further orders per physician

3. Febrile transfusion reactions: Sensitivity of the client’s blood to white blood cells, platelets, or plasma proteins.
   a. S/S: Temp (as high as 104 degrees F), chills, headache, facial flushing, palpitations, cough, chest tightness, increased pulse rate, and flank pain.
   b. Treatment:
      i. Discontinue transfusion immediately
      ii. Give antipyretics (should be obtained from the referring facility)
         1. Tylenol 650mg to 1g PO
         2. Ibuprofen 400-800mg PO
iii. Keep vein open with normal saline
iv. Notify the physician

4. Hemolytic reactions: Incompatibility between client’s blood and donor’s blood
   a. S/S: Chills, fever, headache, backache, dyspnea, cyanosis, chest pains, tachycardia, and hypotension
   b. Treatment:
      i. Discontinue the transfusion immediately. Note: When discontinuing the blood product you must also discontinue the administration set. Use new tubing for the normal saline.
      ii. Keep vein open with normal saline
      iii. Notify physician
      iv. Monitor vital signs
      v. Monitor fluid intake and output

5. Circulatory overload: Blood administration faster than the circulation can accommodate
   a. S/S: Cough, dyspnea, crackles, distended neck veins, tachycardia, and hypertension
   b. Treatment:
      i. Place patient upright with feet dependent
      ii. Administer Lasix 20-40mg IVP
      iii. Administer Oxygen 2-4 L/min via nasal cannula
      iv. Stop or slow the transfusion

6. Documentation
   a. Time and date of reaction
   b. Type and amount of infused blood product
   c. Patient’s vital signs, and all signs and symptoms noted.
   d. Time physician notified and emergency medical treatments provided, including medication administrations with associated times, dosages and the patient’s response to those treatments
   e. Patient’s status at the end of the transport
PURPOSE: This procedure will only be completed by a physician. This protocol is to guide the Advanced Provider in management of a chest tube after it was placed in a patient as treatment for a pneumothorax, hemothorax or other pulmonary indication.

PROCEDURE:

1. Upon arrival to the facility, review most recent radiology report to confirm proper placement and functioning of the placed chest tube.
2. Auscultate breath sounds for presence and symmetry
3. Make sure that all of the connections are taped or banded with wire to prevent accidental separation
4. Ensure that the dressing over the insertion site is securely taped and occlusive. Use a felt tip marker to mark the depth of the tube; if there are markings, note the depth of the tube on the transfer chart. Make sure the tube is sutured, wired or taped so it cannot be accidentally pulled out.
5. Maintain the drainage unit below the level of the chest at all times during transport. Many units have bed hangers so that the unit can be hung on the stretcher. If there is water in the unit keep it upright at all times. If attached to a suction device, find out if the suction can be discontinued for transport; if not, attach a portable suction and or suction in transport unit.
6. Tubing should be kept coiled to prevent kinks or dependent loops
7. Assess and document bubbling in water seal (does not have to be continuous), any output in the collection chamber, and its type (e.g. frank blood).
8. Continuous bubbling may be a sign of a tracheal-bronchial laceration. Large amounts of frankly bloody drainage may need to be balanced by transfusion.
9. Should chest tube be connected to a one-way Heimlich valve, assure connection is tight. Monitor valve for proper function.
10. Assess bilateral breath sounds periodically and document findings.
11. Observe for signs of respiratory distress, subcutaneous emphysema, cyanosis or symptoms of hemorrhage.
12. If signs of tension pneumothorax noted, decompress the chest with needle thoracotomy, and re-evaluate for signs of improvement.
13. Reassessment of the chest tube placement should be confirmed before and after each move of the patient.
14. In the case of accidental dislodgement, cover insertion site with Vaseline type gauze occlusive dressing and tape on three sides.

WARNING: DO NOT clamp tubes for transport. This is likely to cause a tension pneumothorax.
Purpose: There will be occasions when an Advanced Provider is called upon to transport a patient who is in need of or has in place one or more invasive monitoring or central vascular access lines. The purpose of these invasive and/or central vascular access lines are to monitor a patient’s hemodynamic status or for administering fluids and/or medications. The insertion of central vascular lines or invasive monitoring lines is restricted to physicians or designated personnel (requires considerable skill and practice), and is beyond the scope of an Advanced Provider. Although the majority of transports will only require careful monitoring and maintenance of the central line to prevent accidental removal, it is imperative that members of the Advanced Provider transport team be familiar with the use and care of such lines. Transport team members must be familiar with the methods for using each type of catheter and have the knowledge to interpret the data provided. They must also be familiar with common complications involved with these invasive catheters, including what must be done if the catheter is prematurely removed.

Keep in mind, physical assessment techniques, such as capillary refill, skin color, skin turgor, skin temperature, lung sounds, heart sounds, and mental status, should coincide with high-tech invasive hemodynamic measurements.

The following type of invasive monitoring/vascular access lines will be discussed:

1. Central Venous Lines (for measuring CVP).
   a. Monitoring of the CVP is used to determine right ventricular preload and intravascular volume status and to assess right heart function.
2. Arterial Lines (for measuring Arterial Blood Pressure and sampling arterial blood for ABGs)
3. Pulmonary Artery Catheters (Swan-Ganz) (for measuring pulmonary artery pressure/right ventricular pressure and pulmonary capillary wedge pressure)

PROCEDURE:

General Management of Central IV Lines/Invasive monitoring catheters:

1. Mandatory cleansing of hands via washing with soap and water and/or with alcohol-based skin gel before and after contact with a central vascular access/invasive monitoring line/site.
2. Use aseptic technique throughout.
3. Upon patient contact, note the values being displayed and trace the tubing from each transducer to the pressure-monitoring catheter it is connected to.
4. Inspect the insertion site of the invasive catheter/central vascular access line. Check for redness, swelling, bleeding, and patency. If unable to directly visualize site, ascertain from nursing staff the patency and condition of the insertion site based on last dressing change.

NOTE: Be sure you are familiar with the operation of the stopcocks and catheters in use, if not, ask the nurse to give you a bedside review of its proper use.

5. Re-dress or keep insertion site covered with a sterile dressing.

6. Secure the external portion of the central vascular/invasive-monitoring catheter to patient with tape, kling, or other method to prevent accidental removal during transport or movement of patient.

7. Review most recent chest x-ray or x-ray report to confirm proper placement/position of the line (if in the chest). Confirm no pneumothorax.

8. Before loading patient onto stretcher, take note of location/level of any transducer/monometer. Have nurse assist in getting a pressure reading prior to moving patient.

9. Move one pressure cable at a time to the transport monitor, ensuring that wave forms and values are similar to those that were displayed on the hospital monitor.

10. Review written transfer orders and check for orders that pertain to:
   a. Management of the central catheter/monitoring line in transit.
   b. If none found, question the nurse or physician if any orders need to be given for the management of the line.
   c. Desired values/pressure readings during hemodynamic monitoring and what steps to take (or adjustment in medications to make) if the values fall outside the desired parameters. These must be clearly understood before leaving the transferring hospital.

11. Re-assess the catheter/line/setup each time the patient is moved to assure no change in position.

12. Pressure transducers MUST be re-leveled with every position change of the patient.

13. Mark the skin at the referencing level also called the phlebostatic axis.

14. If possible, secure the transducer to the phlebostatic axis.

15. All medications and/or IV fluids used to treat critical patients MUST be on an IV pump and dosed as per physician orders.

16. In general, to accurately obtain invasive pressure measurements, it is important to take the readings at the end of expiration.

17. Should an invasive line come completely out of a patient, apply direct pressure to the insertion site and hold until bleeding stops.
   a. NOTICE: Holding pressure over an arterial site may take longer to control the bleeding.

WARNING: DO NOT attempt to replace a catheter that dislodges but does not come completely out of the patient.

18. Check for patency by attempting to aspirate blood from each of the lumens to determine if each remains in a blood vessel.

19. Options for continued use should be discussed with MD.

Leveling and zeroing the pressure transducers:
1. All invasive monitoring lines that utilize a pressure transducer must be leveled and zeroed to obtain a proper pressure reading. To accurately measure pressure, equipment must be referenced and “zero” balanced to environment and dynamic response characteristics optimized.

2. Reference point for the placement of the transducer is the phlebostatic axis:

3. The transducer must be re-leveled with every position change of the patient; therefore, this point is often marked on the patient’s skin.

4. For each inch that the transducer is leveled above the phlebostatic axis, readings will be 1.86 mm Hg less than the actual pressures in the patient.

5. For each inch that a transducer is leveled lower than the phlebostatic axis, the reading will be 1.86 mm Hg higher than actual.

6. The simplest way to ensure proper placement during transport is to secure the transducer at the phlebostatic axis.

7. Zeroing:
   a. Process in which a transducer connected to the transport monitor is
      i. Opened to the atmospheric air to obtain a baseline reading of pressure in
      ii. The environment.
   b. Ensure the cable is connected to the monitor
   c. Close the stopcock to the patient, open the stopcock to the air
   d. Press the zero button on the monitor
e. Confirm the monitor has accepted the zero value and actually indicates
   i. zero on the pressure and waveform display
f. Zeroing should be performed:
   i. Immediately after connecting the transducer to the transport monitor at
      transferring facility
   ii. Whenever displayed values are in question
   iii. When transducer has been disconnected from pressure cable or pressure cable has
        been disconnected from monitor.
1. CVP measurement should be obtained at the end of expiration for accuracy.
2. If measuring manually with a manometer, be sure the zero point on the manometer is level with the mid-axillary line on a supine patient. (see diagram)
3. Turn stop cock off to patient and allow the manometer to fill with IV fluid.
4. Turn stop cock off to IV fluid and allow the fluid in the manometer to flow into patient.
5. Take measurement at end of expiration when the level in the manometer reaches level where it stops flowing.
6. Record measurement
7. Turn stop cock off to manometer and resume IV fluid administration at desired rate.
8. Secure manometer to prevent accidental disconnect or injury to patient
9. Site is to remain visible throughout the transport.
10. In general:
   a. Elevated CVP (> 10) can be from
      i. Positive pressure ventilation
      ii. Increased peripheral vascular resistance
      iii. Hypovolemia
      iv. Right sided heart failure
      v. Cardiac tamponade
      vi. Tricuspid insufficiency
      vii. Significant vasoconstriction
      viii. Pulmonary embolus
      ix. Obstructive pulmonary disease
   b. Low CVP (<2) can be from
      i. Hypovolemia
      ii. Significant vasodilation
11. Follow written orders from transferring physician when measurements fall outside of normal parameters.
12. Normal range for the CVP is 2-6mmHg
13. If the catheter moved in the chambers of the heart, arrhythmias may be noted. Monitor ECG, SPO2 and BP continuously.
# Arterial Blood Pressure Monitoring

**Purpose**: Provide guidelines for arterial line care and monitoring.

**Policy**: Guidelines are for transport of a patient with an invasive line already in place.

1. Continuous arterial pressure monitoring ("Art line") use for patients experiencing acute hypertension and hypotension, respiratory failure, shock, neurologic injury, coronary interventional procedures, continuous infusion of vasoactive drugs, and frequent ABG sampling.
2. Arterial line set up (see figure next page) should include a bag of IV normal saline enclosed in a pressure bag (pressurized to 300 mm Hg) and connected to special arterial line tubing with a pressure transducer.
3. Level and Zero Transducer (as described above):
4. Take special care/precaution to protect the attached tubing/pressurized bag of IV fluid and catheter from damage or accidental removal from patient.
5. If arterial line is connected to a monitor for continuous monitoring of blood pressure, record measurements in patient care record q 10 – 30 minutes as indicated by the severity of patient condition.
6. High- and low-pressure alarms set based on patient’s current status. Measurements obtained at *end expiration* to limit effect of respiratory cycle on arterial pressure.
7. To help maintain line patency and limit thrombus formation, patient should have in place a continuous flush irrigation system that delivers 3 to 6 ml of IV fluid per hour.
8. Assess neurovascular status distal to arterial insertion site hourly. Neurovascular impairment - result in loss of a limb.
9. Inquire from transferring facility medical staff if arterial line needs to be flushed via the pigtail or squeezable flush system during the transport, and if so, how frequently.
10. Document CMS status distal the insertion site.
11. Correlate the A-line reading with the NIBP readings.
12. If accidental dislodgement occurs, hold pressure at the insertion site for a minimum of 10 minutes until hemostasis is obtained. Apply dressing to the site. Continue to assess site for bleeding and hematoma.

**NOTE**: A-line monitoring is not a substitute for obtaining Non-invasive Blood Pressures (NIBP)

**WARNING**: **DO NOT** use the A-line for the administration of any medication.

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**ATTENTION**: FOR REFERENCE USE ONLY WHEN PRINTED; PLEASE REFER TO ELECTRONIC DOCUMENT FOR MOST CURRENT VERSION
A. Cardiac Output

\[ CO = SV \times HR \]

Or using the Fick Principle

\[ CO = \frac{Oxygen\ consumption}{Arterio-venous\ Oxygen\ Content\ Difference} \]

Using:

1. BSA
2. Hemoglobin level
3. Arterial Oxygen saturation O2 sat from pulse ox

To Calculate CO:

1. Calculate the oxygen consumption based on presumed 125 ml of oxygen consumed per square meter of BSA (1.25 x BSA)
2. Calculate the arterio-venous oxygen content difference. Each gram of hemoglobin can carry 1.36 ml of oxygen. Hence the difference is expressed as follows:

\[ 1.36 \times \text{hemoglobin} \times (\text{Arterial Saturation} – \text{Venous Saturation}) \times 10 \]

3. Divide the calculated oxygen consumption by the calculated arterio-venous oxygen content difference to produce the estimated CO in liter per minute.

**NOTE:** Venous saturation is blood gas sample drawn from pulmonary artery port.

A. Cardiac Index:

\[ \text{Cardiac Index} = \frac{CO}{BSA} \]

B. Mean Arterial Pressure

\[ \text{MAP} = \text{DBP} + \frac{1}{3} (\text{SBP} – \text{DBP}) \]
C. Pulse Pressure

\[ \text{Pulse Pressure} = \text{SBP} - \text{DBP} \]

D. Pulmonary Vascular Resistance

\[ \text{PVR} = (\text{Mean Pulmonary Artery Pressure} - \text{PCWP}) \times \text{CO} \]

E. Systemic Vascular Resistance

\[ \text{SVR} = (\text{MAP} - \text{CVP}) \times \frac{80}{\text{CO}} \times 80 \]

\[ \text{CO} \]

F. Stroke volume

\[ \text{SV} = \frac{\text{CO}}{\text{HR}} \]

G. Stroke Volume Index

\[ \text{Stroke Volume Index} = \frac{\text{SV}}{\text{BSA}} \]
Purpose: The transferring physician may only require that you take care of the ICP device and not necessarily monitor the ICP in transit. Care must be taken to not accidentally dislodge it.

The primary goals of ICP monitoring are identification of ICP trends and evaluation of therapeutic interventions to minimize ischemia in the brain-injured patient. ICP monitoring allows for early detection of intracranial hypertension (> 15 mm Hg) and subsequent aggressive management.

Recall MAP – ICP = CPP where MAP is mean arterial pressure, ICP is intracranial pressure and CPP is cerebral perfusion pressure. If the ICP rises too high, it will decrease the CPP. The goal is for the cerebral perfusion pressure to be maintained between 50 to 70 mm Hg. In order to achieve this, the Advanced Provider may be given orders from the transferring facility on parameters to maintain the ICP and if necessary, drain off fluid to lower the ICP if it rises.

Signs and Symptoms:

Procedure:

1. Cushing’s triad (widening pulse pressure, bradycardia, and abnormal respiratory patterns)
2. Hypertension
3. Increased respiratory rate
4. Pulmonary edema

Equipment:

1. External drainage system with mounting card
2. Pressure tubing with 48” pressure tubing
3. Sterile 0.9% sodium chloride (NaCl) with sterile 20 ml syringe
4. Pressure monitoring cable
5. IV tubing
6. Bag-Valve Mask and 100% oxygen source
7. Cardiopulmonary monitor
8. BSI attire.
9. MUST use aseptic technique at all times.
10. If using the CORDIS EDS DEVICE (most commonly used)
a. Assemble the Cordis EDS as instructed per the package insert and per the mounting card diagrammatic instructions, using 0.9% NaCl to flush the system. Place the 48” tubing, with connected pressure transducer, on the plastic mounting card.
b. Avoid tension or kinking of the pressure monitoring cable
c. Place the patient in a semi-fowler’s position and position the zero reference point at the outer canthus of the eye
d. Obtain the ICP waveform on the cardiopulmonary monitor. Turn the stopcock nearest the patient so that the ICP waveform is visualized.
e. Zero the transducer at the distal stopcock
f. Record the ICP on the printer and mark and post the strip. Calculate and record the CPP on the strip.
g. For continuous drainage, turn the stopcock nearest the patient so that drainage resumes and pressure monitoring is discontinued. Note: It is recommended that pressure monitoring and CSF drainage not be done simultaneously.
h. Maintain a clean and intact dressing. If the dressing is soiled or contaminated, change it using a sterile technique.

4. If other type of monitoring system and/or external drainage system is in use, the CCT team MUST review the equipment with the transferring staff and be absolutely confident in their capability of monitoring the ICP and or draining the CSF as ordered by the transferring MD.
5. The physician’s order for drainage must include a pressure reading either in mm Hg or (as marked on mounting card) at which the drainage cylinder must be maintained.
6. The zero reference point for ICP monitoring always remains the outer canthus of the eye.
7. Only small amount of CSF (not to exceed 3ml) should be drained at one time. Rapid cerebral decompression from CSF over-drainage may result in herniation.
8. Simultaneous drainage and pressure monitoring are not recommended
   a. To ensure precise pressure measurements, perform only pressure monitoring while keeping the stopcock closed to the drainage system
9. Precautions:
   a. Tight connections must be maintained
   b. System must remain free of air
   c. Never use a flush device for ICP monitoring
   d. Use only sterile 0.9% NaCl to fill the pressure tubing.
   e. Never use a heparinized solution
   f. Must maintain proper leveling and zeroing of system
   g. Care must be taken when turning or positioning patient to avoid accidental decannulation or disconnection of the tubing.
   h. Maintain HOB at 30° to 45° head-up
   i. If monitor

10. You may be given other orders and provided medications to administer to manage the increased ICP during transport including:
   a. Intubate and mechanically ventilate the patient. Do not hyperventilate the patient unless he or she acutely deteriorates.
   b. Consider an osmotic diuretic such as Mannitol
c. Administration of dexamethasone or methylprednisolone
d. Maintain blood pressure to systolic of less than 150 mm Hg
e. If surgical drain (bolt) has been installed, you may be ordered to drain CSF if the patient with intracranial hemorrhage was on Coumadin, you may be requested to give fresh frozen plasma or platelets (provided by the transferring facility)

Medical Transport, LLC

Policy Number: 7.4

Section/Section Code:
Patient Care Guidelines (PCG)

Subject: IABP
Creation Date: February 14, 2016
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Affected Departments: All Departments
Pages: 4
Effective Date:

Purpose: To guide the Advanced Provider in transporting a patient on an Intra-Aortic Balloon Pump. At least one member of the transport team MUST be a certified perfusionist, Physician, Physician’s Assistant, or a Registered Nurse trained to operate an Intra-Aortic Balloon Pump console, or other person certified to operate the IABP Console on all IABP transports.

Equipment:
The following equipment should be available for IABP transports:

Policy:

1. IABP with transport module
2. Appropriately sized balloon catheters with insertion kit (Only if qualified personnel will be accompanying the transport team to use this)
3. Spare Helium tank (200 psi)
4. Operator’s manual
5. Stopcocks
6. 60-ml syringe (Luer tip)
7. Skin electrodes
8. IABP extension tubing
9. Doppler ultrasound device (to assess distal pulses)
10. Extra EKG cables
11. 2” cloth tape to secure IABP EKG electrodes and catheter to patient
12. Arterial pressure monitoring transducer and setup
13. Pressure transducer cables
14. Arterial flush solution (500 ml NS with 1,000 U of heparin)
15. Adapters to fit other brands of balloon catheters to the IABP console
16. Knee immobilizer (if available but not mandatory)
17. Soft restraints

General Guidelines:
1. When entering the facility to transport a patient receiving IABP therapy, visually assess the surroundings to ensure that hallways, elevators and routes of travel will accommodate necessary equipment and personnel.
2. Obtain patient report
3. Ascertertain current IABP settings and note typical pressures (console systolic, diastolic, augmentation, and mean arterial pressures)
4. Determine IABP catheter model, size, and insertion depth (measurement at insertion site). Know and document the insertion depth prior to moving
5. Ascertain that the balloon tip location has been verified by chest x-ray.
6. Conduct an assessment. IABP focus includes inspection of the insertion site for active bleeding, peripheral pulses in both lower extremities (may require doppler confirmation), and a radial pulse in the left upper extremity (to ensure subclavian blood flow)
7. Attach new EKG leads and secure each lead over the electrode with 2” cloth tape. This step will prevent lead disconnection and potential loss of trigger during transport.
8. Ensure the IABP tubing and the catheter are taped securely to the patient’s leg, however, DO NOT TAPE THE IAB CATHETER AND THE IAB TUBING TOGETHER AT THE CONNECTOR. IF THE IAB TUBING IS ACCIDENTLY PULLED, IT IS BETTER FOR THE BALLOON CATHETER TO SEPARATE FROM THE TUBING AT THE CONNECTOR THAN FOR THE BALLOON TO BE PULLED OUT WITH THE TUBING.
9. Apply a knee immobilization splint to the leg in which the IABP was inserted to prevent leg flexion during transport (if needed).
10. Ensure that the appropriate connectors to attach the IABP to the transport console are available. Determine the console that will be used at the receiving facility, and be certain to take any necessary adapters or connectors (usually included in the IABP insertion kit)
11. Move the patient to the transport stretcher. Connect and secure all pumps, monitors, ventilators, and other equipment. Do not elevate the head of the bed greater than 30 degrees.
12. Transfer the IABP to the transport console at the bedside or in the transport vehicle (if the IABP console is mounted in the vehicle).
13. Establish power to the transport IABP console.
14. Open the helium tank, and verify pressure.
15. Follow the IABP console instructions for start-up (on console help screens or in the manufacturer-provided user manual).
   a. Establish EKG and pressure waveforms from the patient
   b. Confirm initial pump settings
   c. Set timing
   d. Initiate IAB pumping
   e. Set console alarms
   f. Confirm all pump settings
16. Optimize IABP timing in the 1:2 mode
   a. Ensure the IABP is set to Autopilot mode confirming correct inflation/deflation
   b. If manual adjustment is required, set deflation to achieve the lowest possible diastolic pressure while maintaining maximal augmentation.
17. Assess pressures every 5 minutes or with any changes in the patient’s condition during transport. Check the insertion site and pulses every 15 minutes.
18. Restrain and sedate patient as needed
   a. Use soft restraints PRN to protect patient from causing harm if he is confused and may pull at tubes, etc.
   b. Can sedate with Versed 1 – 2 mg IV PRN up to 6 mg to keep sedated.

NOTE: if any complication occurs, contact medical control physician immediately for assistance or see below

IABP EMERGENCY INTERVENTIONS:

Console Failure:

If the IABP console becomes disabled, manual inflation and deflation should be performed as soon as possible. The balloon must not remain idle (i.e., immobile) in a patient for more than 30 minutes. To manually inflate and deflate the IABP Catheter:

1. Disconnect the IABP from the male Luer end of the extension tubing
2. Attach the three-way stopcock and 60 ml syringe to the IABP catheter’s male Luer.

WARNING: Never inject air into the central lumen (female Luer hub).

3. Aspirate to ensure that blood is not returned through the extracorporeal tubing.

WARNING: If blood is aspirated from the male Luer fitting of the extracorporeal tubing, immediately remove the IABP catheter owing to damage to IABP.

4. Inflate the IABP with 40 ml of air or helium, and immediately aspirate. Repeat every 5 minutes while IABP is inactive.

Cardiac Arrest:

1. Switch the IABP trigger to pressure mode.
2. Initiate CPR
3. Provide standard ACLS and BCLS resuscitation, including defibrillation, if indicated
4. Once return of spontaneous circulation occurs, MAP is adequate (> 60 mm Hg), and the EKG rhythm is stable, return the IABP trigger to EKG mode

Balloon Rupture or Leak:

1. Inspect IABP tubing frequently for blood in air channel
   a. If blood detected inside gas lumen of catheter, **IABP therapy should be discontinued immediately**
   b. Catheter should be disconnected
   c. If signs/symptoms of gas embolus are present, place patient in the left lateral recumbent position
d. Administer high flow oxygen
e. Transport to nearest appropriate facility

2. If gas alarm sounds on console
   a. Assess patient and tubing, check connections
   b. If source of leak cannot be determined then assume an IABP leak is possible.

NOTE: Fever and tachycardia can cause a gas loss alarm to sound.

Depletion of Helium:
1. If console indicates “empty tank”, verify the tank valve is open
2. If tank requires changing, close the valve on depleted tank and replace with full one. Be sure the washer is in position between the tank and the regulator (similar to an oxygen tank)

Excessive Bleeding;
1. Apply direct pressure to insertion site.
2. Consult med control (Transferring or receiving MD or EMS MD) for consideration to discontinue infusion of anticoagulation medications
3. If bleeding cannot be controlled, divert to the closest appropriate facility.

Catheter Migration or Accidental Removal:
1. IABP catheters have sterile sheaths that allow for the adjustments of the insertion depth without contaminating the catheter
2. If catheter has moved significantly but has not become dislodged or disconnected from the sterile sheath, The IABP should be placed on standby mode (pumping stopped) and the catheter reinserted to the appropriate depth (same level as when patient was picked up)
   a. Significant accidentally movement of more than a few cm should not be adjusted without consulting med control (transferring MD, receiving MD, or EMS MD).
3. If movement of catheter occurred at the referring facility;
   a. Request a chest X-ray prior to transport to verify the location of the catheter.
   b. Consult the MD who inserted catheter to re-evaluate position
4. If significant movement/migration or accidental removal occurred during transport, consider discontinuing IABP therapy ONLY after consulting with physician.
PURPOSE: From time to time EMS will be called upon to transport patients whose ventilations are being assisted by a mechanical ventilator. Ventilators are used to provide respiratory support for patients who are unable to effectively breathe on their own. This protocol will guide the caregiver in maintaining proper settings involved in providing adequate ventilator assistance to the patient.

INDICATIONS:
1. Continuation of ventilator controlled respirations on chronic ventilator dependent patients
2. Assist/Control ventilations on any intubated patient in respiratory failure/arrest that is being transport to a specialty care facility.

Initial Ventilator Set up: Volume Control should be the standard breath type unless the patient:
1. is experiencing high PIPs not corrected by suctioning and other standard interventions
2. is known or suspected to have ARDS / Acute Lung Injury
3. has flow requirements that cannot be met with Volume Control Ventilation
4. is experiencing poor oxygenation / ventilation despite maximal support with Volume Control Ventilation
5. is currently being ventilated in pressure control and is doing well.

Tidal Volume
1. 8ml/kg Ideal body weight in most patients.
2. This should be reduced to 4 – 6ml/kg ideal body weight in the setting of ARDS / Acute Lung Injury.
3. A Plateau Pressure should be assessed as soon as possible after the patient is settled on the ventilator.
4. The tidal volume should then be adjusted between 4 and 8ml/kg PBW in an effort to achieve a
   a. Plateau pressure less than or equal to 30.
5. Smaller than necessary tidal volumes should not be utilized due to the risk of CO2 retention, acidosis, and atelectasis.
6. Predicted/Ideal Body Weight can determined via the preprinted reference cards or be calculated via the following, gender based formulas:
   i. **MALE**: 50 + 2.3 [height (in inches) - 60]
   ii. **FEMALE**: 45.5 + 2.3 [height (in inches) - 60]

Ventilation Mode
1. Assist Control unless the patient has been on SIMV and is doing well.
2. If the patient is to be left on SIMV, consider adding Pressure Support to reduce the patient’s work of breathing during spontaneous respirations.

**Pressure Support**
1. Added slowly (approximately 5) and watch patient’s work of breathing and exhaled volumes on spontaneous breaths to determine if the pressure support should be increased further.

**Rate:**
1. Adjust as needed to maintain PH and PCO2 within parameters.
2. If tidal volume reduction is necessary, adjustment of the ventilator breath rate may be needed in order to achieve / maintain the desired PCO2 and minute ventilation.
3. A formula that can be used to more accurately make ventilator adjustments to achieve or maintain a desired PaCO2:

**FIO2**
1. Titrated to achieve SPO2 between 94 and 99% or as appropriate for the patient’s condition.
2. PEEP can be utilized to reduce FIO2 requirements.

**PEEP**
1. Pressure of 3 – 5 cm H2O is considered physiologic.
   a. 5 cm and above will enhance oxygenation.
   b. PEEP can cause hypotension, particularly if the patient is hypovolemic. This can often be corrected with a fluid bolus.

**Alarms**
1. Appropriate use of the alarms are an important part of safely operating a mechanical ventilator.
2. This becomes particularly important in the transport environment.
3. Guidelines for appropriate alarm settings are as follows:
4. Volume Control Ventilation
   a. High Pressure Alarm: 10 Points above Baseline
   b. Low Pressure Alarm: 10 Points below Baseline
   c. Low Minute Volume Alarm: 10 to 15% below Baseline
5. Pressure Control Ventilation
   a. ABG’s should be considered 20 minutes after initiation of mechanical ventilation.

**Ventilation and Oxygenation Maintenance:**
1. Manipulate ventilator settings to maintain:
2. pH 7.35 - 7.45
3. pO2 greater than or equal to 80 mm Hg or SPO2 of 94-99% or as appropriate for patient condition.
4. pCO2 35 - 45 mm HG. *( Aim closer to 35 in the setting of suspected acute brain injury)*
5. Monitor SpO2 continuously.
6. Monitor EtCO2 and waveform capnography continuously.

**NOTE:** Do not make adjustments in minute volume based solely on EtC02 values without ABG corroboration.
VENTILATION STRATEGIES FOR SPECIFIC PATIENT TYPES

ARDS / Acute Lung Injury:

1. Lung injury in the ARDS patient is not uniform. The delivered tidal volume tends to take the path of least resistance and goes preferentially to the non-injured areas of the lung. This puts those previously non / less injured areas at risk for over distension and ventilator associated lung injury which further complicates patient management. The risk can be minimized by adjusting tidal volumes to maintain a plateau pressure of less than or equal to 30.

   a. Mode

      i. Assist Control will be the standard mode with which to ventilate these patients. This will provide maximal ventilatory support to the patient and help minimize work of breathing. Exceptions to this will be if there is a problem with auto-PEEP or difficulties with auto-cycling of the ventilator.

   b. Breath type

      i. Pressure or Volume Ventilation can be used.

         1. **Pressure control ventilation** ensures pressure limited breaths, which also limit PIP and Plateau pressure. Tidal volume is delivered early in the breath, which may improve gas exchange and reduce the patient’s work of breathing. Variable tidal volumes are a more natural way of breathing and may be more comfortable for the patient. Alarms must be set appropriately with close attention paid to minute ventilation / exhaled volumes. If compliance deteriorates, exhaled volumes will decrease. This will worsen CO2 retention, acidosis and atelectasis if allowed to go uncorrected.

         2. **Volume ventilation provides** a consistent tidal volume. Appropriate alarm parameters are also necessary in this context. High PIP’s are an indication of an increase in the risk of barotrauma. PIP’s are primarily an indicator of upper airway pressures and high PIP’s may indicate increased risk of barotrauma. Plateau pressures are a more appropriate indicator of the pressures in the lower airways and alveoli. PIP’s are monitored on a breath to breath basis. Unless the patient is bronchospastic, it is likely that, at least a portion of that pressure is being transmitted to the lower airways and alveoli. Remember that inspiration is terminated when the high PIP alarm is triggered; this happening repeatedly can lead to hypoventilation.

   c. Tidal volume

      i. 4 – 8 ml/kg PBW to maintain plateau pressure as described above.

   d. Breath Rate

      i. 12 to 20 BPM.
1. Remember, if it becomes necessary to decrease the tidal volume due to high PIPs / Plateau pressures it may be necessary to increase the respiratory rate to maintain adequate minute ventilation.

e. PEEP
   i. 5 to as much as 15 cm. High PEEP may cause hypotension, particularly if the patient is hypovolemic. A fluid bolus may be helpful. Permissive hypercapnia may become necessary to reduce breath rate and or tidal volume to reduce PIPs / Plateau pressures.

f. Inspiratory time
   i. 0.8 – 1.2 seconds. Longer inspiratory times improve oxygenation by increasing mean airway pressures (MAP). Keep in mind that longer inspiratory times mean less time for exhalation. Insufficient expiratory time causes air trapping AKA auto-PEEP.

g. FIO2
   i. Adjust in an effort to maintain pulse oximetry 88 to 92%. Keep FIO2 as low as possible while maintaining oxygen saturations within parameters.

ASTHMA AND COPD:

1. These patients should be managed aggressively with NPPV, bronchodilators, and steroids to avoid intubation and mechanical ventilation if possible. If it becomes necessary to intubate the patient, it should be accomplished as soon as possible. Respiratory failure and hypercapnia will develop rapidly once the patient begins to tire.

   a. Mode
      i. If the patient is breathing spontaneously, SIMV may be helpful in reduction of auto-PEEP. Consider adding pressure support to reduce work of breathing with spontaneous breaths.

   b. Tidal Volume
      i. 4 – 8ml/kg IDW to achieve plateau pressure less than or equal to 30.

   c. Breath Rate
      i. 6 to 25 BPM, these patients are at high risk to develop auto-PEEP. An inappropriately high respiratory rate is one of the causative factors of auto-PEEP. Adjust the breath rate to allow for full exhalation prior to the next breath being initiated. Permissive hypercapnia is recommended to reduce the risk of ventilator associated lung injury from high airway pressures and barotrauma.

   d. PEEP
      i. 4 – 10cm. Additional PEEP may be necessary to balance auto-PEEP. However, do not apply more than 80% of the auto-PEEP value. Applied PEEP does not combine with auto-PEEP to increase airway pressures, further compromise hemodynamics, or increase pneumothorax risk unless the applied PEEP is in excess of 80% of the auto-PEEP. If PIPs increase after the application of additional PEEP, reduce the applied PEEP in an attempt to maintain PIPs less than or equal to 30.

   e. Inspiratory Time
      i. 0.8 to 1.2 seconds. Longer than necessary inspiratory times are another causative factor of auto-PEEP. Shorter inspiratory times allow for longer
exhalation times resulting in less risk of auto-PEEP. Keep the inspiratory time short enough to allow the patient to fully exhale prior to the initiation of the next breath.

t. **FIO2**
   i. Adjust to maintain oxygen saturation of 94-99% or as appropriate for patient condition.

g. **Breath type**
   i. Pressure Ventilation is generally preferred. Adjust to total PIP of less than or equal to 30. Patients with chronic lung disease have higher than normal flow requirements. Flow is automatically adjusted in pressure control. Monitoring exhaled volumes is a good method of assessing changes in compliance.

**BURNS AND SMOKE INHALATION:**

1. In addition to direct injury and the resulting edema, this patient population is at risk for airway compromise from ARDS, pneumonia, pulmonary edema, pulmonary embolism, and carbon monoxide poisoning. Patients with burn injuries / smoke inhalation of sufficient severity to warrant intubation should be assumed to have carbon monoxide poisoning and ventilated using 100% oxygen until proven otherwise.

   a. **Mode**
      i. Assist Control is commonly used to provide maximal support with minimal patient effort.

   b. **Tidal Volume**
      i. 4 – 8ml/kg PBW to achieve a plateau pressure less than or equal to 30.

   c. **Breath Rate**
      i. 6 – 20 BPM Be aware of the potential for auto-PEEP secondary to air flow restrictions from edema in these patients.

   d. **PEEP**
      i. 5 – 10cm Adjust based on FIO2 requirements and hemodynamics.

   e. **Inspiratory Time**
      i. 0.8 – 1.2 seconds

   f. **FIO2**
      i. 100% until the possibility of carbon monoxide poisoning can be ruled out via a carboxyhemoglobin level.

<table>
<thead>
<tr>
<th>Settings</th>
<th>Adult</th>
<th>Pediatric</th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rise time</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Flow Termination</td>
<td>25%</td>
<td>30%</td>
<td>35%</td>
</tr>
<tr>
<td>Time Termination</td>
<td>2.0</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>PCFT</td>
<td>On</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>Leak Compensation</td>
<td>On</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>NPPV</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
</tbody>
</table>
OBJECTIVE: To establish guidelines for the selection of patients appropriate to receive noninvasive positive pressure ventilation (NPPV) and define procedures for the administration of NPPV with the LTV 1000 Ventilators.

INDICATIONS:
1. Adult patients with respiratory compromise of sufficient severity to warrant ventilatory support but in whom it is desirable to avoid intubation. At least two of the following criteria should be present:
   a. Respiratory distress with moderate to severe dyspnea,
   b. Use of accessory muscles, and abdominal paradox.
   c. Arterial pH less than 7.35 and
   d. PCO2 greater than 45
   e. Respiratory rate no greater than 25 breaths per minute.

CONTRAINDICATIONS:
- Apnea
- Recent surgery or trauma to the face upper airway or upper GI tract
- Fixed upper airway obstruction
- Absent or insufficient ability to protect airway
- Life threatening hypoxemia
- Hemodynamic instability
  i. Should have a B/P > 100 and a MAP > 60
- Impaired consciousness
- Confusion / agitation
- Vomiting
- Bowel obstruction
- Copious respiratory secretions
- High risk for aspiration

NOTE: Discussion with physician regarding patient selection may be helpful.

EQUIPMENT NEEDED: LTV 1000 Ventilator, patient appropriate ventilator tubing, patient and device appropriate mask with system for securing it to the patient’s face.

PROCEDURE:
1. Prepare ventilator and tubing as usual
2. Tape holes in mask (if applicable) to minimize air leaks.
3. Put ventilator into noninvasive mode
4. Settings for NPPV

**NOTE:** Inspiratory pressure (top number) is represented as the pressure control value. *A good starting point for this is 10.* **Titrate the inspiratory pressure upward to correct ventilation problems (i.e. high PCO2).** To avoid gastric insufflation, the inspiratory pressure should not exceed 20.

**NOTE:** The LTV 1000 does not compensate for PEEP. If for example you need an inspiratory pressure of 20 you need to set an inspiratory pressure of 20 above PEEP.

1. Bi-PAP Settings: IPAP/EPAP
2. CPAP Settings: PEEP
3. EPAP (bottom number) is represented as PEEP. A good starting point for this is 5.
4. IPAP (top number) is represented as Pressure Support.
5. Titrate the expiratory pressure upward to correct problems with hypoxemia. The expiratory (IPAP) pressure should not exceed 10.
6. Maintain a 5 to 8 point difference between inspiratory and expiratory pressures.
7. Inspiratory time 0.8 to 1.2 seconds.
8. **IMPORTANT:** Set breath rate to (--) . In the event of apnea, the ventilator will alarm and initiate a back-up ventilatory rate of 12 breaths per minute. Particularly at lower pressure settings, this will probably not generate a sufficient tidal volume to support the patient.

Remember: Apnea is a contraindication to NPPV. If this occurs, the patient will need to be intubated and ventilated.

9. Adjust FiO2 to maintain SPO2 of 94 to 99%

10. ABGs 20 minutes after initiation (optional)

**Manipulate NPPV settings to achieve:**
1. pH 7.35 to 7.45
2. PO2 greater than or equal to 75mmHg or SPO2 should be between 94-99%
3. PCO2 35 to 45 mm Hg.

**Pearls, Pitfalls and Considerations**
1. All patients receiving NPPV should have an AMBU bag and mask of appropriate size accompany them throughout the transfer process.
2. Monitor ETCO2 and SPO2 continuously
OBJECTIVE: To enable the Advanced Provider to administer bronchodilator therapy to intubated adult patients who are actively wheezing or exhibiting other signs of airflow restriction on exam.

Pearls, Pitfalls, and Considerations: Combivent is Albuterol and Atrovent (ipratropium bromide) mixed together as one medication. Atrovent is contraindicated for patients with allergies to soy lecithin or related food products such as soybeans or peanuts.

High dose bronchodilator therapy may be necessary to reverse the bronchospasm associated with acute asthma. Consider appropriate steroid therapy to accompany the inhaled bronchodilators. See guidelines 2.5 Acute Asthma Exacerbation and 2.7 Respiratory Failure.

PROCEDURE:
A nebulizer adapter with an attached nebulizer should be used to administer nebulized medications to the mechanically ventilated patient.

1. The nebulizer should be placed on the inspiratory limb of the circuit (not the limb with the PEEP valve) between the corrugated tubing and the wye.
2. The nebulizer should be removed from the ventilator tubing as soon as the treatment is completed. Nebulizer adapter cap is closed WHENEVER the nebulizer not in place to prevent leaks from the ventilator circuit.

Initial bronchodilator therapy should consist of Combivent. If the patient has already received anticholinergic therapy (usually Atrovent), administer Albuterol. If necessary, administer follow-up bronchodilator therapy in twenty minutes.

Consult with Physician prior to administration of either medication if patient’s heart rate is greater than 150. Subsequent bronchodilator therapy should consist of Albuterol up to eight puffs repeated as necessary at 20-minute intervals.

Consult with physician prior to administration if patient’s heart rate increases by more than 20 beats per minute from pre-combivent baseline.
INDICATIONS: A temporary pacing electrode is utilized to increase the heart rate in the bradyarrhythmias and asystole, or to overdrive pace tachyarrhythmias. It may also be used prophylactically following a myocardial infarction and for diagnostic testing (pacing induced ischemia).

PREPARATION PROCEDURE:
1. Explain the procedure to the patient.
2. Assemble the necessary equipment / supplies

CARE: The pacing electrode insertion is done by a physician qualified in the procedure.

1. Monitor the patient’s heart rhythm.
2. Prepare the external pacing generator:
   i. set the mA at 6 or as suggested by the sending physician
   ii. set the rate at 10 BPM below the patient’s intrinsic rate
   iii. set the sensitivity fully clockwise (most sensitive)
3. Connect the proximal (+) and the distal (-) leads to the extension cable.
4. Tighten the connectors securely, but do not tape the connections.
5. Turn on the external generator and observe the EKG monitor for evidence of pacing and capture.
6. Determine the sensing threshold:
   i. Turn the rate 10 BPM above the patient’s intrinsic rate
   ii. Turn the sensitivity control counter clockwise slowly until the pacemaker begins to fire; this is the threshold. Set sensitivity at one half the threshold value.
7. Cover the insertion site with a sterile dressing.

Be sure the pacing electrode position is anchored securely with tape. Secure the pacing generator and place the plastic cover over the pacemaker controls. Review portable CXR for electrode placement after insertion, if available.

Note: This is a different indication than obtaining an x-ray after an airway is completed. Please evaluate for pneumothorax or pneumopericardium.

CONSIDERATIONS:
1. Monitor the patient’s heart rhythm closely during insertion
2. Ventricular irritability is common as the electrode is positioned in the right ventricle
3. When the "paceport" PA catheter is inserted, a continuous infusion regulated by an infusion pump must be connected to the orange port. This will maintain patency of the port in the event
the Chandler probe needs to be repositioned. The pacing lumen will accommodate infusions up to 30ml/hr.

4. Document depth of insertion of pacing catheter.

THE ELECTRICAL SAFETY PRECAUTIONS INCLUDE THE FOLLOWING:
1. All line-powered equipment must be grounded (i.e., 3 pronged plugs).
2. Non-Sterile gloves are worn when handling the exposed electrode tips.
3. The pacing electrode tips should be individually insulated when not connected to the pacing generator.

FAILURE TO CAPTURE is usually due to electrode displacement or a high stimulation threshold in the electrode area. The Advanced provider should:
1. Check and tighten all connections.
2. Increase the pacemaker output / mA.
3. Turn the patient to a left lateral recumbent position.
4. Consider contacting receiving cardiologist if effective capture is not regained after the above interventions.
5. Monitor the patient closely; manage according to ACLS guidelines as needed.
6. Prepare to reposition the transvenous-pacing electrode if needed.
7. Place the external pacer on the patient and pace if needed for symptomatic bradycardic arrhythmia.

FAILURE TO PACE WITHOUT A SPIKE PRESENT is usually caused by a broken or loose connection, electrode fracture, and inhabitation of pacemaker output, battery or circuit failure. The Advanced Provider should:
1. Check and tighten all connections.
2. Check for any equipment that might cause electrical interference and remove if possible.
3. Replace the battery and/or pacing generator.
4. Place the external pacer on the patient and pace if needed for symptomatic bradycardic arrhythmia.
5. Monitor the patient closely; manage according to ACLS guidelines as needed.

FAILURE TO “SENSE” occurs when the pace maker does not sense an intrinsic beat. Competitive pacing spikes or complexes are seen on the EKG. With failure to sense, the under-sensing leads to over-pacing.

The Advanced Provider should:
1. Check and tighten all connections.
2. Check the sensitivity setting; make it as sensitive as possible. (dial set fully clockwise @ 5 o’clock).
3. Place the patient in a position where adequate sensing was last observed. A left lateral recumbent position may help.
4. Increase the pacing rate to override the intrinsic rhythm if possible.
5. Turn the pacemaker off IF it is not needed, but do not disconnect from the electrode wires.
   Notify the physician of this immediately.
6. Monitor the patient closely if effective sensing is not regained after the above interventions.
OVER-SENSING usually occurs because the pacemaker sensitivity is set too high. It should be suspected when pauses are seen intermittently on the EKG or when the paced rate falls below that set on the pacemaker generator. This pacemaker-induced problem may be mistaken for electrode fracture or impending generator failure. Oversensing leads to under-pacing. The Advanced Provider should:

1. Consult physician for orders.
2. Decrease the sensitivity on the pacemaker (turn the dial counter clockwise).
3. Replace the pacemaker generator if the problem continues.
4. Consider transcutaneous pacing.
INDICATIONS: To allow rapid entrance into the airway for ventilation and oxygenation when other means of airway control (BVM, intubation, etc.) have proven unsuccessful.

CONTRAINDICATIONS:
1. The ability to obtain airway control and effective ventilation by less invasive means.
2. Pediatric patients (less than 12 years old).
3. Inability to identify proper landmarks.

EQUIPMENT:
1. Oxygen.
2. Suction.

Using the Cook Emergency Cricothyroid Cuffed Set
1. Betadine.
2. #15 scalpel.
3. 10ml syringe.
4. Introducer needle.
5. TFE introducer catheter.
7. Curved dilator.
8. Airway catheter (trach).
9. 4 x 4’s.
10. Tracheal ties.

For standard surgical technique
1. Scalpel
2. 6 – 7 ETT
4. Gauze.
5. Kelly clamp.

PROCEDURES:
1. Using the Cook Emergency Cricothyroid Cuffed Set
   a. Open the airway and position the head so the neck is clearly visible. If the patient has sustained any type of spinal trauma, maintain cervical spine precautions at all times.
   b. After locating and palpating the cricothyroid membrane, clean the area thoroughly with Betadine or chlorohexadine.
c. Stabilize the cricothyroid membrane and make a vertical incision in the midline using the #15 scalpel blade. The incision should be long enough to accommodate the dilator and trach.
d. Attach the 10ml syringe to the 18 gauge TFE catheter and advance it through the incision into the airway at a 45 degree angle to the frontal plane on the midline in a caudad direction. While advancing the needle forward, verify correct placement in the trachea by aspirating for free air return.
e. Remove the syringe and needle, leaving the TFE catheter in place. Advance the soft flexible end of the wire guide through the TFE catheter into the airway several centimeters.
f. Remove the TFE catheter, leaving the wire guide in place.
g. Advance the handled dilator, tapered end first, into the connector end of the airway catheter until the handle stops against the connector.
h. Advance the dilator over the wire guide until the proximal stiff end of the wire guide is completely through and visible at the handle of the dilator. It is important to always visualize and hold the proximal end of the wire guide during the airway insertion procedure to prevent its inadvertent loss into the trachea.
i. Maintain the wire guide position; advance the emergency airway access assembly over the wire guide with a rotating motion into the trachea. Care should be taken not to advance the tip of the wire guide within the trachea.
j. Remove the wire guide and the dilator simultaneously.
k. Inflate the cuff.
l. Manually secure the tracheostomy tube while beginning to ventilate the patient using a Bag Valve mask. Confirm placement by auscultating for equal, bilateral breath sounds and observing for equal, bilateral chest expansion. Secure the tracheostomy tube in place with tracheostomy tape or ties.

2. Using Standard Surgical Technique
   a. Open the airway and position the head so the neck is clearly visible. If the patient has sustained any type of spinal trauma, maintain cervical spine precautions at all times.
b. After locating and palpating the cricothyroid membrane, clean the area thoroughly with Betadine or chlorohexadine.
c. Stabilize the cricothyroid membrane and make a 2cm vertical incision in the midline using the #15 scalpel blade.
d. Dissect bluntly through the subcutaneous tissues until the membrane is visible.
e. Carefully make a 2-3cm horizontal incision through the membrane.
f. Use a curved hemostat to apply traction to the cricothyroid membrane allowing for tube insertion.
g. Insert an appropriately sized, cuffed endotracheal tube into the cricothyroid membrane incision, directing the tube distally into the trachea until the cuff is securely in the trachea.
h. Inflate the cuff.
i. Manually secure the tube while beginning to ventilate the patient using a bag valve mask. Confirm placement by auscultating for equal, bilateral breath sounds and observing for equal, bilateral chest expansion.
j. Secure tube.
k. Continue to assist ventilation via BVM with continual assessment of adequacy of ventilation.

INDICATIONS:
1. Inability to effectively ventilate the patient by any other means.
2. Pediatric patient (less than 12 years old) with inability to ventilate by any other means (surgical cricothyrotomy is contraindicated in this age group).
3. This procedure is only used for short term (<45 minutes) of ventilation and oxygenation.

CONTRAINDICATIONS:
1. The ability to effectively ventilate the patient by any other means.
2. This procedure is not a substitute for airway control with a cuffed tube.

EQUIPMENT:
1. Bag valve mask.
2. Oxygen.
5. Jet ventilator (if available).

PROCEDURE:
1. Open the airway and position the head so the neck is clearly visible. If the patient has sustained any type of spinal trauma, maintain cervical spine precautions at all times.
2. After locating and palpating the cricothyroid membrane, clean the area thoroughly with Betadine or chlorohexadine.
3. Attach the syringe to a 14-gauge (3’’ in length) angiocath.
4. Stabilize the cricothyroid membrane between the thumb and the index finger.
5. Insert the catheter into the cricothyroid membrane at a 45 degree angle in a caudad direction.
6. While advancing the catheter, gently aspirate with the syringe. When air is easily aspirated, the catheter lumen is in place in the trachea.
7. When the tracheal lumen is entered, withdraw the needle and advance the catheter.
8. Attach either the BVM or jet ventilator to the catheter and ventilate the patient.
9. Confirm placement by auscultating the equal breath sounds and observing for equal, bilateral chest expansion.
10. Secure the catheter to the neck.
11. To ventilate using the thumb control on the valve. Deliver 100% oxygen in intermittent bursts <50psi at a rate of 20 bursts / minute.

<table>
<thead>
<tr>
<th>Medical Transport, LLC</th>
<th>Policy Number: 8.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section/ Section Code:</td>
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<tr>
<td>Patient Care Guidelines (PCG)</td>
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<tr>
<td>Subject: Securing Pediatric Patients</td>
<td>Creation Date: February 14, 2016</td>
</tr>
<tr>
<td>Affected Departments:</td>
<td></td>
</tr>
<tr>
<td>All Departments</td>
<td>Pages: 2</td>
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**Purpose:**
The purpose of this policy is to describe the expectations concerning the appropriate and approved methods to secure pediatric patients for transport.

**Policy:**
Medical Transport, LLC considers anybody under the age of fourteen (14) to be a pediatric patient. The appropriate restraint for the pediatric patient is determined by individual size and weight. Obviously, the larger pediatric patients will be secured in the ambulance using standard guidelines.

Smaller and lighter patients need to be secured differently. Medical Transport, LLC mandates that all patients weighing less than 40 pounds (18 kg) are to be secured in the five point PediMate device that is a component of the standard equipment set, or an approved car seat.

Pediatric patients weighing less than 10 lbs. (4.5 kg) must be restrained in an approved car seat, belted to the stretcher facing aft, and secured with the head of the stretcher fully upright. The aforementioned car seat is not maintained as a component of the standard ambulance equipment set due to the relative bulkiness of the device.

The child is to be secured in the car seat, attached to the stretcher in an aft facing position and loaded in the transport team employing the safest and most secure method deemed appropriate for the specific mission requirements. The car seat is to be secured to the stretcher in an aft facing orientation using at least two (2) of the stretcher seat belts.

Any questions or problems encountered in this process should be directed to the Operations Supervisor, or Team Leader.
Notes:
GOALS: These guidelines are designed for Children ages 1 month to 12 years, or less than or equal to 40 kg. Patients who are older or who have greater weight can be addressed as adult patients and/or discussed with medical control.

Contacting receiving Pediatric ICU Staff.
For patients to be admitted to the Pediatric facility from another facility, and prior to departure with the patient, the transport team is encouraged to achieve dialogue with a physician in order to ensure alignment of management plans between the sending and receiving clinicians. Pediatricians are available to transport team for consultation and medical control for any patient under the age of 18 regardless of patient destination.

INDICATIONS: All pediatric patients will be monitored during transport.

PROCEDURES:
1. All patients will be continuously monitored with EKG, pulse oximetry, non-invasive BP, and ETCO2 if intubated.
2. BP’s (via NIBP or transducer) will be checked at a minimum of q 15 minutes or more frequently as condition warrants.

NOTE: There is currently no evidence to suggest that NIBPs should not be obtained on pediatric patients during transport. Attempts MUST be made to obtain an accurate NIBP ensuring the correct cuff size and documenting the location of the assessment.
3. Alarms should be set appropriate for age.
4. Temperature will be continuously monitored during transport, (if initial temperature <36 or >38) using skin or rectal probe.
5. Glucose assessment should be performed as a matter of routine with any critically ill child, or in whom the diagnosis is uncertain. Children of one (1) year of age or less are particularly at risk for hypoglycemia.
6. Treatment of Hypoglycemia (< 60mg/dl)
   a. Dextrose 0.2 – 0.25 g/kg (Dilute to ≤ 25%)
      i. D10 2 – 2.5 mL/kg
   b. Glucagon
      i. < 20kg 0.5mg IM
      ii. > 20kg 1mg IM
General guidelines for normal pediatric vital signs are as follows:

### Pediatric Quick Reference Chart

<table>
<thead>
<tr>
<th>Age</th>
<th>Heart Rate</th>
<th>Respiratory Rate</th>
<th>Systolic BP</th>
<th>Weight (kg)</th>
<th>Laryngoscope Blade</th>
<th>ET Tube</th>
<th>Suction Catheter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn (to 30 days) &amp; Infant (to 1 year)</td>
<td>100 – 160</td>
<td>30 – 60</td>
<td>Minimum 60</td>
<td>Newborn 3-5 kg</td>
<td>0-1 straight</td>
<td>3.0-3.5 uncuffed</td>
<td>6-8 Fr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Infant 6-8 kg</td>
<td>1 straight</td>
<td>3.5 uncuffed</td>
<td>8 Fr</td>
</tr>
<tr>
<td>Toddler (1 – 3 years)</td>
<td>90 – 150</td>
<td>24 – 40</td>
<td>Minimum 70</td>
<td>Toddler 10-11 kg</td>
<td>1 straight</td>
<td>4.0 uncuffed</td>
<td>8-10 Fr</td>
</tr>
<tr>
<td>Preschooler (3 – 5 years)</td>
<td>80 – 140</td>
<td>22 – 34</td>
<td>Minimum 75</td>
<td>Small Child 12-14 kg</td>
<td>2 straight</td>
<td>4.5 uncuffed</td>
<td>10 Fr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Child 15-18 kg</td>
<td>2 straight or curved</td>
<td>5.0 uncuffed</td>
<td>10 Fr</td>
</tr>
<tr>
<td>School Age (6 – 10 years)</td>
<td>70 - 120</td>
<td>18 – 30</td>
<td>Minimum 80</td>
<td>Child 19-22 kg</td>
<td>2 straight or curved</td>
<td>5.5 uncuffed</td>
<td>10 Fr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Large Child 24-30 kg</td>
<td>2-3 straight or curved</td>
<td>6.0 uncuffed</td>
<td>10 Fr</td>
</tr>
<tr>
<td>Adolescent (11 – 18 years)</td>
<td>60 - 100</td>
<td>12 - 16</td>
<td>Minimum 90</td>
<td><em>Adult</em> Greater than or equal to 32 kg</td>
<td>3 straight or curved</td>
<td>6.5 cuffed</td>
<td>12 Fr</td>
</tr>
</tbody>
</table>

*ATTENTION: FOR REFERENCE USE ONLY WHEN PRINTED; PLEASE REFER TO ELECTRONIC DOCUMENT FOR MOST CURRENT VERSION*
**INDICATIONS**: Pediatric patients who present with an obstructed airway, compromised spontaneous breathing (hypoventilation), unremitting hypoxemia, and apnea.

**PROCEDURE**:

1. If a patient exhibits effective spontaneous ventilation, administer oxygen appropriate for patient’s condition, and attach to monitoring devices.
2. If a patient exhibits ineffective ventilation, attempt to open the airway.
3. In the trauma patient utilize a jaw thrust maneuver in combination with cervical spine immobilization.
4. In the non-trauma patient, utilize the head tilt, chin lift maneuver. Padding underneath the shoulder can be effective in assisting in maintaining an open airway in infants.
5. If apnea is present, or if ventilation is ineffective, attempt to ventilate using the bag-valve-mask with 100% oxygen. Use appropriately sized airway adjuncts as indicated.
6. An oropharyngeal airway is indicated for the unconscious patient without a gag reflex.
7. A nasopharyngeal airway may be better tolerated in the patient with a gag reflex.
8. If unable to ventilate, reposition the head and/or neck and reattempt to ventilate. If still unable to ventilate, assess for upper airway obstruction.
10. Back blows, chest thrusts < 1yr. Heimlich maneuver > 1yr.
11. If obstruction is noted and irresolvable, surgical airway is needed.
12. See indications and procedure in Needle Cricothyroidotomy ([Procedures 7.10](#)).
13. Indications for endotracheal intubation include:
   **Under 14 years of age - PARAMEDIC SKILL ONLY**
   a. Inadequate central nervous system control of ventilation.
   b. Functional or anatomic airway obstruction.
   c. The need for high peak inspiratory pressure to maintain effective alveolar gas exchange.
   d. Probable loss of airway control during transport due to the nature of the illness or injury.
   e. Severe systemic illness (sepsis) or injury with shock.
   f. Suspected intracranial lesion (e.g., head injury with GCS <8).
   g. Evidence of airway burns and/or smoke inhalation.
14. ET tube size is (age in years + 14) /4 mm. (Cuffed ETTs) Endotracheal tube depth is age in years + 8.
15. Check to be sure a functioning IV/IO line is in place.
16. Connect patient to a cardiac monitor and to a pulse oximeter.
17. Allow the patient to breathe 100% oxygen by BVM (assist ventilation if indicated).
18. Pharmacologically assisted intubation: Special pediatric specific considerations below: Also see Protocol 2.3 (Intubation – PAI/Rapid Sequence Intubation)

   a. Atropine 0.02 mg/kg IV (*all children < 5) (min: 0.1mg/dose) (max: 0.5mg/dose) for prevention of laryngeal stimulation induced bradycardia and excess salivation. Consider in patients less than 5 years old. Consult with ED Pediatrician prior to transport.

   b. Ketamine: 2.0 mg/kg IV or 5 mg/kg IM is the RSI induction agent of choice in the instances of pediatric bronchospasm or hypotension. In instances where intracranial pressure may be elevated due to a mechanical obstruction, Etomidate remains the induction agent of choice.

CAUTION: unless an asthmatic child is in extremis (compromised mental status), do not intubate prior to achieving communication with the ED Pediatrician.
Purpose:
Describes the appropriate treatment for Pediatric Cardiac Arrest.

Policy:
All Medical Transport, LLC Advanced Providers expected to recognize and appropriately treat cardiac arrest based on accepted PALS standards or Regional Guidelines.

Specific Information Needed:
1. Past medical history, age, medications, allergies.
2. Onset of symptoms (sudden, gradual, precipitating events).
3. Prior cardiac disease (arrhythmias, pacemaker, cardiac medications), exercise level.
4. Associated symptoms: chest pain, dizziness, syncope, trouble breathing, abdominal pain, fever.

Specific Objective Findings:
1. ECG, Vital signs, SpO2.
2. Signs of absent cardiac output:
   a. Unresponsive
   b. Skin- cool/clammy, pallor
   c. decreased capillary refill
   d. No breathing
3. Signs of cardiac arrest:
   a. Neck vein distention
   b. Absent lung sounds.

Treatment Protocol:
1. Treat ABC’s
2. Administer moderate to high flow O2 based on oxygen needs to maintain SPO2 94-99%
3. Provide adequate compressions at approximately 100-120/min.
4. Place Cardiac monitor/Multi-function pads STAT on the patient (anterior / posterior
position, if possible), for quick and hands free cardioversion, defibrillation, or external pacing, should this become necessary.

5. Monitor and document the cardiac rhythm. Post a rhythm strip. Consider these factors:
   a. Is there a pulse corresponding to monitor rhythm?
   b. Rate: bradycardia, tachycardia normal?
   c. Are the ventricular complexes wide or narrow?
   d. What is the relation between atrial activity (P waves) and ventricular activity (QRS)?
   e. Is the arrhythmia potentially dangerous to the patient?
7. Treat per PALS, or Regional Guidelines for presenting arrhythmia.
9. Divert to the closes hospital for stabilization.
**INDICATIONS:** Calculation of initial maintenance fluid requirements in the infant and child who has received adequate fluid resuscitation and presents with effective systemic vascular perfusion.

**PROCEDURE:**

1. Bolus with Normal Saline at 20ml/kg, then change to maintenance as follows:
   a. Infants smaller than 10 kilograms: D5 0.25% NS at a rate of 4ml/kg per hour.

4. Children 10 to 20 kilograms: Infusion of D5 0.45% NS at a rate of 40ml/hour, plus 2ml/kg per hour for each kilogram >10 kg from 11 to 20 kg (i.e., the maintenance rate for a 15-kg child is 40ml/hour + 2ml/kg per hour (2ml x 5kg) = 50ml/hour).

5. Children larger than 20 kilograms: Infusion of D5 0.45% NS at a rate of 60ml/hour plus 1ml/kg per hour for each kilogram > 20kg (e.g., the maintenance rate for a 30kg child is 60ml/hour + 1ml/kg per hour for each kg from 21-30 kg (1ml x 10kg) = 70ml/hour).

**Pediatric Maintenance Fluid Requirement**

<table>
<thead>
<tr>
<th>Approximate Weight</th>
<th>ML/HR</th>
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<tbody>
<tr>
<td>.5 kg</td>
<td>.20 ml/hr.</td>
</tr>
<tr>
<td>10 kg</td>
<td>.40 ml/hr.</td>
</tr>
<tr>
<td>15 kg</td>
<td>50 ml/hr.</td>
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<tr>
<td>20 kg</td>
<td>60 ml/hr.</td>
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<tr>
<td>25 kg</td>
<td>.65 ml/hr.</td>
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<tr>
<td>30 kg</td>
<td>.70 ml/hr.</td>
</tr>
<tr>
<td>35 kg</td>
<td>.75 ml/hr.</td>
</tr>
<tr>
<td>40 kg</td>
<td>80 ml/hr.</td>
</tr>
</tbody>
</table>
INDICATIONS: Pediatric patients who are ill or injured after a history of environmental exposure or cold-water submersion will be resuscitated, even if apparently lifeless.

PROCEDURE:

1. Monitor cardiac rhythm and vital signs as per protocol.
3. Secure airway, ventilate as needed, and administer high flow oxygen.
4. See adult hypothermia protocol. Differences are listed below:
   a. If a perfusing cardiac rhythm is present, treat hypotension with warmed Normal Saline, 20 ml/kg IV. Repeat fluid bolus up to 3x PRN for continued hypotension.
   b. If hypotension persists, refer to Protocol 8.10
   c. If blood glucose < 60mg/dl, refer to Protocol 8.1.8
   d. Consider nasogastric tube and urethral catheter if the patient remains unconscious.
   e. Continue external rewarming measures during transport (hot packs, thermal blankets/sleeping bag, hood, and warm cabin).
   f. Monitor for cardiac rhythm changes and the development of respiratory difficulties secondary to (prior) aspiration or pulmonary edema.
**INDICATIONS:** A pediatric patient with known or suspected infection will receive appropriate supportive care and pharmacological intervention. Signs and symptoms of infection may vary with age, but generally include fever, altered level of consciousness ranging from irritability to unconsciousness. Additional system related signs and symptoms might occur. Infections can occur for a variety of reason.

**PROCEDURE:**
1. Maintain Respiratory Precautions
2. Ensure droplet precaution isolation.
3. Insure that appropriate antibiotics have been initiated, and continued during transport as needed.
4. If febrile, consider acetaminophen, 15mg/kg PR.
5. If hypotension persists, refer to Protocol 8.10
6. If blood glucose < 60 mg/dl, refer to Protocol 8.2
INDICATIONS: Any pediatric patient who has been acutely poisoned by virtue of exposure (via any route), to a substance, which exerts deleterious effects upon the body.

PROCEDURE:

1. Obtain a history of the poisoning. Determine substance, route (ingestion, injection, inhalation, or topical), chronology, and medical intervention attempts. Contact the Poison Control Center before leaving the scene/outside hospital, if this has not yet been done (1-800-222-1222).
2. Secure electrolytes, including serum blood glucose, obtain recommended lab work before departure. Always check fingerstick blood glucose. It is impossible to describe the management of every poisoning within these guidelines. Maintain a low threshold for contact of medical control, pre-departure.
3. Secure airway per pediatric Airway Management protocol, and ventilate and oxygenate per Pediatric Respiratory Failure protocol as needed.
4. Monitor vital signs and assess the patient, including neurological evaluation.
5. Syrup ipecac is contraindicated.
6. Following lavage, and after communication with pediatrician, with physician order administer activated charcoal 1gm/kg per NGT and clamp. Should be given prior to departure, if indicated.
7. For CNS depression, consider administration of naloxone, 0.1mg/kg IV (max dose = 2 mg). Administer BEFORE transport. Check finger-stick blood sugar (FSBS) to confirm that altered L.O.C. is not due to hypoglycemia, if L.O.C. deteriorates en-route.
8. Secure for transport and apply restraints as needed.
9. Follow Pediatric Monitoring protocol enroute, and guard airway per Pediatric Airway Management protocol.
PROCEDURE: Maintain airway and oxygenation (per Airway Management Protocol). Bradycardia in the Pediatric patient may be a sign of respiratory failure, and should be initially treated with oxygen and increased ventilation.

1. Upper airway causes of respiratory failure include:
   a. Foreign body/Mechanical obstruction: (Protocol 8.1 Airway Management or Needle Cricothyrotomy, Protocol 7.9)
   b. Epiglottitis: Signs and symptoms may include abrupt onset of stridor, high fever (> 102 degrees F), sore throat, drooling and petechiae. Airway management of epiglottitis is difficult due to severe epiglottic swelling. Initial efforts should be directed toward oxygenating the patient and positioning to facilitate ventilation with minimal manipulation. Drooling and tripod position are distinguishing features of epiglottitis. If the patient has assumed a tripod position, continue to allow this posture during transport.
      i. Consult with physician for any patient with suspected epiglottitis predeparture. Optimal management of epiglottitis involves securing the airway at the facility of origin using a team comprised of Anesthesia, and Surgeon or ENT physician. If this is impossible, the Advanced Provider MUST communicate with the physician for all steps of decision making.
   d. Severe croup: Provide cool mist, a quiet environment and racemic epinephrine 1:1,000 2.25% (5mg/0.5ml) solution with 3 ml NS via nebulizer. This should be administered predeparture at the referring hospital.
      i. Methylprednisolone Sodium Succinate (Solu-Medrol) 2mg/kg IV (max single dose = 125mg) **Physician Order**.
      ii. Consider antibiotics prior to departure per dialogue with physician.
2. Lower airway causes of respiratory failure may be caused by asthma, viral infections, bacterial pneumonia, interstitial or alveolar disease, anaphylaxis, congestive heart failure or trauma.
   a. Passive oxygenation with FIO2 titrated to SPO2 92-99%.
   b. Bronchodilators via nebulization – may be administered Q 20 minutes or continuously.
      i. Albuterol 2.5 mg in 2.5 ml normal saline.
      ii. Atrovent 0.5 mg in 2.5 ml normal saline.
   c. If respiratory failure continues, attempt positive pressure ventilation with bag valve mask and 100 % oxygen. Mask ventilation is not acceptable for more than a few minutes of transport however, due to the risk of gastric distention and aspiration and should therefore be followed by intubation, per protocol, and positive pressure ventilation with 100 % oxygen.
3. In trauma situations, respiratory failure may be a result. Intubate per pharmacologically assisted intubation protocol for any of the following as indicated:
   a. Flail chest
   b. Pulmonary contusion (Severe)
   c. Pneumothorax
   d. Hemothorax
   e. Open thoracic injury
      I. Tension pneumothorax (known or suspected):
         a. **DECOMPRESSIVE NEEDLE THORACOSTOMY** in second intercostal space
            1cm below clavicle in the midclavicular line with 18g angiocath.
INDICATIONS: For the patient experiencing seizures, the Advanced Provider will attempt to identify the cause and treat accordingly. Common, treatable causes of acute pediatric seizures include hyperthermia, hypoglycemia, hypoxemia, trauma, metabolic and toxic disturbances, electrolyte alterations, and infections.

Transport may also be indicated for exacerbation of chronic seizures for which causes may include: previous head injury, familial or congenital origin, and idiopathic etiologies.

PROCEDURE:

1. Assess airway, ventilate as needed, and administer high flow oxygen.
2. Seizure duration should be controlled, if possible, to avoid complications. Determine cause, if possible, by history and assessment.
3. Fever. Check body temperature and request administration of acetaminophen 15 mg/kg/PO/PR/PNGT.
4. If blood glucose < 80 mg/dl and the patient is symptomatic, refer to Protocol 8.2
5. Hypoxemia. Monitor peripheral oxygen saturation via pulse oximetry. Administer oxygen as needed. High flow oxygen is most appropriate during an active grand mal seizure. Insertion of an oropharyngeal or nasopharyngeal airway is appropriate if it can be done prior to trismus.
6. Be alert for signs of emesis. Suction and turn head to side to avoid aspiration. Log roll if patient has potential for spinal injury.
7. Medicate the seizing patient as indicated below:
   a. Choose One Benzodiazepine
      i. Midazolam 0.1 mg/kg Repeat x 1
      ii. Lorazepam 0.15 mg/kg Repeat x 1
      iii. Watch for respiratory depression and hypotension; be prepared to secure the airway, refer to Protocol 2.3 if necessary
   b. If seizures persist and cannot be controlled
      i. Age > 1
         1. Request Fosphenytoin 20 PE/kg in 100mL over 10 – 20 minutes
         2. MAX dose 1500 mg PE
         3. Watch for cardiac dysrhythmias
         4. Infuse at rate < 150 PE/min
      ii. If Age < 1, patient has allergy to Fosphenytoin, or continues to have seizures
         1. Consider Levetiracetam (Keppra) Consult with pediatrician.
         2. Phenobarbital
            a. Consult with pediatrician or referring physician.
Medical Transport, LLC

Policy Number: 8.10

Section/Section Code: Patient Care Guidelines (PCG)

Subject: Pediatric Refractory Shock

Creation Date: February 14, 2016

Revision Date: July 6, 2018

Affected Departments: All Departments

Pages: 1

Effective Date:

Objectives: To optimize the management of pediatric patients demonstrating the clinical signs of shock, septic or otherwise.

Special Considerations: All vasoactive medications administered to pediatric patients should be given via constant flow syringe pump. Consider all causes of shock including, but not limited to: pneumothorax and hemorrhage.

Therapeutic endpoints:
1. Normalization of heart rate
2. Cap refill less than 2 seconds
3. Normal pulse strength with minimal difference between central and peripheral pulses.
4. Urine output greater than 1 ml/kg/hr.
5. Normal mental status

Procedure:
1. Identify symptoms indicative of evolving or ongoing shock.
3. Effective IV access.
4. Obtain venous or capillary blood gas and glucose values from facility. Frequently monitor blood glucose level and correct for hypoglycemia.
5. Consider Isotonic Saline or colloid fluid bolus of 20ml/kg over 10 minutes. Repeat boluses as needed (total required is often up to 60-100 ml/kg).
   a. Unusual cases of pure cardiogenic shock could be made worse by excessive fluids.
7. Shock refractory to fluid therapy, a physician may order;
   a. Consider Dopamine 0.5 to 20mcg/kg/min titrate to achieve therapeutic endpoints.
   b. For shock refractory to fluid resuscitation and Dopamine, consider Epinephrine infusion 0.01 to 0.5 mcg/kg/min. Additional intravascular volume replacement likely needed in these refractory cases
   c. Consider adding Dobutamine 2 to 30 mcg/kg/min for patients with known cardiogenic etiologies.
8. Foley catheter and monitor urine output.
INDICATIONS: Any patient with a known spinal column injury, a (spinal) neurological deficit, or a mechanism of injury consistent with possible spinal injury will be properly immobilized for transport.

Pearls, Pitfalls and considerations:
1. Follow Regional protocol for spinal immobilization and refer to Protocol 5.5 spinal injury for clearance and IFT Transport.
2. If immobilization is required, a KED for immobilizing children ages 8-10. If required, a long board underneath can be used to facilitated transport.

PROCEDURE:
1. Immobilize patient with device that functions best for patients size, at discretion of the transport crew.
2. Protect the patient’s airway as needed before and after immobilization. For details, one can refer to Protocol 8.2 Airway Management for details. Administer oxygen as appropriate.
3. Initiate intravenous access and treat neurogenic shock. If the patient is hypotensive, refer to Protocol 8.10
4. Consider appropriate anxiolysis, if vital signs are adequate, if needed to prevent/decrease excessive movement within immobilization devices.
   a. Refer to Protocol 8.12, Pediatric Sedation
5. If the patient requires intubation and airway management, refer to Protocol 2.3
6. If the patient is intubated and is known to have a spinal cord injury, a foley catheter should be in place for transport. Document residual volume.
7. Ensure gastric decompression by inserting and securing a nasogastric or orogastric tube.
Medical Transport, LLC

Policy Number: 8.12

Section/Section Code: Patient Care Guidelines (PCG)

Subject: Pediatric Sedation

Creation Date: February 14, 2016

Revision Date: July 6, 2018

Affected Departments: All Departments

Pages: 1

Effective Date:

INDICATIONS: Intubation with and without mechanical ventilation, severe pain, anxiety, agitation

CAUTION: (Consult with attending physician for these circumstances): Impending respiratory failure (non-intubated), shock, drug overdose, altered mental status.

PROCEDURE:
1. For sedation:
   a. Midazolam: 0.1 mg/kg (max 10 mg) IM/IV every 5 minutes.
   b. Lorazepam: 0.15 mg/kg IV/IM/PR q 10 min (single dose not to exceed 4 mg)
   c. Consult with MD for option of:
      i. Ketamine: 0.5mg/kg IV or 3-5 mg/kg IM. (concurrent administration of atropine at 0.01mg/kg with minimum dose of 0.1 mg will minimize hyper-salivation.) Ketamine also possesses analgesic properties.
2. For agitation/psychosis consider:
   a. Midazolam 0.1 mg/kg (max 10 mg) IV/IM every 5 minutes.
   b. Lorazepam: 0.15mg/kg IV/IM/PR q 10 min (single dose not to exceed 4 mg)
3. For Mechanical Ventilation consider:
   a. Midazolam 0.1mg/kg (max 10 mg) IV/IM every 30 minutes – 1 hour
   b. Lorazepam: 0.15 mg/kg IV/IM/PR q 10 min (single dose not to exceed 4 mg)
   c. Propofol: 1- 2 mg/kg bolus then 5 to 150 mcg/kg/min infusion.
   d. Ketamine: 0.5 - 2 mg/kg IV for hypotensive and/or bronchospastic patients. May also administer 3 to 5mg/kg IM if no IV/IO access available. Ketamine also possesses potent analgesic properties.
**INDICATIONS:** Any pediatric patient with pain due to injury or disease.

**PROCEDURE:**

1. Maintain adequate airway and ventilation.
2. Administer O2 as indicated.
4. Attempt to treat cause of pain (e.g., reposition, etc.).
5. For pain unrelieved by other interventions, consider requesting:
   a. **Acetaminophen**: 15 mg/kg PO
   b. **Fentanyl**: 1 mcg/kg IV/IM then 0.5-1 mcg/kg IV/IM q 5-10 minutes with titration to pain control, wakefulness and airway protection.
      i. Consider 0.5 to 2 mcg/kg Intranasal route as well if there is an available atomizer.
   OR
   c. **Morphine sulfate**: 0.1mg/kg IV/IM every 10 minutes PRN pain. (for infants < 2-3 mos. use 0.03 – 0.05 mg/kg q 10 min).
   d. **Zofran**:
      i. **Zofran**: 4 mg IV over 2-5 minutes if greater than 40 kg.
      ii. 0.1 mg/kg IV over 2-5 minutes if less than or equal to 40 kg. Use caution in patients less than 12 months of age or < 10 KG
6. Dosages may be repeated every 20-30 minutes for a total of two doses
7. Administer **naloxone** (Narcan) 0.1mg/kg IV/IM (max dose = 2 mg) for respiratory depression or signs of a narcotic overdose, and manage airway as needed.
**Objective:** To identify and continue treatment for the pediatric patient with Diabetic Ketoacidosis (DKA).

**Indication:**
Pediatric patients with known Diabetes Mellitus (DM) presenting with elevated blood glucose levels. Pediatric patients presenting with related signs and symptoms for possible DKA, such as Kussmaul breathing, poor peripheral perfusion, altered mental status, a history of weight loss, polyuria, polydipsia, or polyphagia.

**Considerations:**
1. Sepsis work-up as clinically indicated by referring facility for patients presenting with DKA (if CBC obtained, initial WBC will likely be elevated and may not be indicative of underlying infection).
2. Rapid reductions in serum blood glucose levels (More than 100mg/dl per hour) may cause profound cerebral edema and should be avoided. High risk patients for cerebral edema include patients <5 years of age, those with an initial pH <7.0, newly diagnosed DM patients, and significantly dehydrated patients with marked elevations in BUN.
3. IV Bolus of insulin is NOT indicated.
4. Initiation of insulin infusion is not mandatory, but should be considered for worsening acidosis or a long transport.

**Diagnostic Criteria for DKA:**
To meet criteria for entering DKA protocol, patients should meet one of the clinical indications listed above, and the following biochemical parameters:
1. Glucose value greater than 200 mg/dl (may be <200 mg/dl in rare situations, especially in infants)
2. Serum bicarbonate less than 15mEq/L
3. Venous blood pH less than 7.25 or arterial pH less than 7.3
4. Presence of elevated serum ketones (>1.5mmol/L) or positive urine ketones (large).
5. Known or high index of suspicion of diabetes mellitus.

**Evaluation:**
1. Monitor vital signs, weight (in kg), oximetry, neurologic status, and cardiac rhythm.
2. Repeat Glucose every 30 minutes. Do not reduce blood sugar by more than 100mg/dl per hour.
3. Check Neurologic status (mental status, pupil response) Q1 hour. Watch for signs of cerebral edema (altered mental status, severe headache, hypertension and bradycardia) consider requesting:
   a. **Mannitol** 0.25 to 1.0 gm/kg IV bolus.

**Intervention:**

1. **Fluid Management:**
   a. IV Bolus: IV/IO. Give an IV bolus of 20ml/kg NS (maximum 1 liter) over 1 hour if the child is hypotensive **ONLY**. Consult Physician if further fluid needed.
   b. After completion of bolus, continue maintenance IV fluids of ½ NS with 20mEq of KCL added at rate prescribed by referring physician.

2. **Glucose Management** (when insulin infusion has already been initiated).
   a. Monitor patient for falling glucose levels as described below:
   b. If glucose is below 250mg/dl, change IV fluid to D5 ½ NS with 20mEq of KCL added at rate prescribed by referring physician.
   c. If glucose continues to fall despite D5 ½ NS with 20mEq of KCL added at rate described below in table, continue fluid and decrease insulin by 0.25u/kg/hr (with consultation with referring physician).
   d. If Insulin infusion **HAS** been initiated by sending facility, monitor for falling glucose levels as described below and contact pediatrician:

3. **Insulin Infusion:**
   a. Run 50 ml of solution through IV tubing to saturate binding sites on the tubing.
   b. Infuse IV piggyback at a rate of 0.1 u/kg/hr (1 ml/kg/hr) on IV pump for children >3 years of age.
   c. Infuse IV **Insulin** drip rate of 0.05u/kg/hr (0.5 ml/kg/hr) for children ≤3 years of age.
   d. Continue IV **Insulin** infusion with IV maintenance fluid infusion until serum HCO3 is ≥18mEq/L.

**Pediatric Maintenance Fluid Requirement in DKA**

<table>
<thead>
<tr>
<th>Approximate Weight (kg)</th>
<th>ML/HR of either 0.9% NS or D5 ½ NS Saline if FSBG less than 250mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 kg</td>
<td>30 ml/hr.</td>
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<tr>
<td>10 kg</td>
<td>60 ml/hr.</td>
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<tr>
<td>15 kg</td>
<td>75 ml/hr.</td>
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<tr>
<td>20 kg</td>
<td>90 ml/hr.</td>
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<tr>
<td>25 kg</td>
<td>98 ml/hr.</td>
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<tr>
<td>30 kg</td>
<td>105 ml/hr.</td>
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<tr>
<td>35 kg</td>
<td>113 ml/hr.</td>
</tr>
<tr>
<td>40 kg</td>
<td>120 ml/hr.</td>
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</tbody>
</table>

Note: above are 1½ time normal maintenance infusion

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**ATTENTION:** FOR REFERENCE USE ONLY WHEN PRINTED; PLEASE REFER TO ELECTRONIC DOCUMENT FOR MOST CURRENT VERSION
**Objectives:** Restoration of cardiac output to improve tissue oxygenation and inadequate perfusion by maintaining an open ductus arteriosus and expanding intravascular volume as appropriate.

**Procedure:**

1. Assess and manage airway, breathing and circulation.
2. Monitor ETCO2 if intubated.
3. Apply oxygen and determine response.
4. Obtain the largest IV access for the patient’s size, two if possible.
   a. If unable to obtain IV access, IO access should be obtained without further delay.
5. If no improvement in hypoxia with oxygen
   a. Consider initiating prostaglandin E1 (from sending facility), alprostadil infusion (patient must be intubated prior to initiation). Carefully monitor patient for hypotension due to vasodilatory effects with prostaglandin.
   b. Start 0.1mcg/kg/min infusion and titrate to improved oxygenation and systemic perfusion, usual 0.02 – 0.5mcg/kg/min
   c. If signs of pulmonary vascular congestion and/or fluid overload are present, withhold fluid bolus and administer furosemide (Lasix) 1mg/kg IV.
6. If no evidence of fluid overload
   a. Resuscitate with 20ml/kg crystalloid bolus over 5-10 minutes.
   b. Repeat up to two times for a total of 60 ml/kg if patient remains in shock, unless signs of fluid overload are present.
7. For patients failing initial fluid bolus, request inotropic support
   a. Dopamine 2-20mcg/kg/min
   b. Dobutamine 2-20mcg/kg/minute.
   c. Epinephrine 0.1-1mcg/kg/min.
8. If blood glucose < 80mg/dl, and the patient is symptomatic refer to Protocol 8.2
9. Monitor urine output by indwelling urinary catheter if available. Titrate resuscitation to 1ml/kg/hr.
1. Pre-departure assessment and stabilization is as critically important for the pregnant patient as for the neonate; once enroute, few options are available, either diagnostically or therapeutically. Keep moving.
2. If fetal distress develops, it is difficult to intervene during patient transport
3. Monitor status of child pre-departure;
4. **If the transport team feels uncomfortable, reject the transfer; contact physician as soon as possible.**
5. Physician dialogue is imperative.
6. Contact physician if any of the following signs or symptoms are present:
   a. Coagulopathy; (Disseminated Intravascular Coagulation);
   b. Fetal distress;
   c. Excessive maternal hemorrhage;
   d. Regular contractions (active labor);
   e. Hemodynamic instability;
   f. Severe abdominal pain;
   g. Seizures/neurological instability;
   h. Pulmonary edema;
   i. Severe hypertension;
   j. Advanced cervical dilatation (>4 cm) relative to gestational age
7. Controlled labor, on MgSO4 or other tocolytics – patient transfer is acceptable; uncontrolled labor necessitates dialogue between referring clinician and peri-natologist/OB medical control;
8. Indications for F.H.T. monitoring (if available) include the following:
   a. Increased contractions;
   b. Bleeding
   c. D.I.C.
INDICATIONS: VAGINAL BLEEDING, ABRuptio placenta, & placenta previa

PROCEDURE:

1. Consider delayed transfer if maternal or fetal distress is already noted.
2. Assess and manage airway, breathing and circulation control as indicated. Provide supplemental oxygen. If necessary, ventilate the patient with 100% oxygen using a bag valve mask or transport ventilator.
3. Strict bed rest. Left lateral recumbent position. If bleeding copiously, elevate legs to increase blood supply to vital organs.
4. Determine if the patient has increased uterine tone or specific areas of tenderness (i.e. increased uterine irritability or cramping). Determine the amount of bleeding. Estimate volume of bleeding and determine if it is arterial or venous in origin.
5. Monitor cardiac rhythm, pulse oximetry, and maternal vital signs.
6. Obtain large bore IV access (at least 2) and fluid resuscitate as indicated
7. Establish fetal heart monitoring and determine gestational age of the fetus.
8. Frequently assess fetal heart rate and report persistent late decelerations, tachycardia and loss in variability to receiving facility prior to arrival.
9. If hypotension is present consider boluses of 250 cc NSS/LR IV. If hypotension persists, consider administration of PRBC’s and blood products as indicated.
10. Assess for signs of labor. Vaginal exams should be avoided. Vagina exam will increase bleeding in instances of placenta previa.
11. Consider insertion of an indwelling urinary catheter, especially if contractions are present.
12. Emotional support to the mother and family.
13. Observe for signs of DIC including evidence of petechiae, coagulopathy by hematuria, ecchymosis, bleeding from IV sites, and document the PT/PTT and CBC.
14. Consider requesting administration of tocolytics in the presence of premature labor, FOR THE PURPOSE OF COMPLETING THE TRANSPORT ONLY, if ordered by receiving physician. IV Terbutaline and Ritodrine are contraindicated in the presence of hemorrhage.
15. For patient who exhibits a coagulopathy, obtain appropriate blood component products for administration enroute, as per referring institution.
16. It is important to notify the accepting institution for any significant changes to have appropriate personnel waiting for the transporting team’s arrival.
INDICATIONS: Pregnant patients who have pain from labor or from an illness or injury who are hemodynamically stable should be medicated, with physician order, to help reduce or alleviate pain. Pregnant patients who have nausea and/or vomiting may be treated with a medication to relieve symptoms and increase comfort.

PROCEDURE:
1. Assess patient’s hemodynamic status and level of pain and/or nausea.
2. For pain consider:
   a. Fentanyl (Class C) 1 to 3mcg/kg IV PRN.
3. For nausea and/or vomiting administer:
   a. Zofran (Class B) 4mg IV push. For persistent nausea/vomiting may need to be repeated q 20-30 minutes PRN up to 16 mg.
4. Reassess patient hemodynamically and document level of relief of pain and/or nausea.
5. Naloxone may be used to reverse respiratory depression induced by narcotics (Class B).
INDICATIONS:
1. BP greater than 140/90 or a 30mmHg rise in systolic pressure or 15mmHg rise in diastolic pressure above baseline (pre-eclampsia) after the 20th week of pregnancy.
2. This may be accompanied by proteinuria and edema.
3. Treatment is more urgent if any of the following have occurred:
   a. Preterm labor
   b. Intra-cerebral bleeding,
   c. Seizures.
   d. Severe, continuous headache, often frontal or occipital.
   e. Dimness or blurring of vision.
   f. Persistent vomiting.
   g. Decreased urine excretion (<400 ml/24 hours); increased proteinuria (3+–4+).
   h. Fetal growth retardation.
   i. Cardiac decompensation, pulmonary edema, or cyanosis.
4. In addition, staff must be cognizant of the potential of HELLP syndrome if the patient complains of RUQ abdominal pain.

PROCEDURE:
1. Definitive treatment can only be accomplished through delivery of the fetus(es). This should be considered prior to transfer if the hospital has the capability to perform the delivery
2. Assess and manage airway, breathing and circulation. Provide supplemental oxygen to maintain SpO₂ > 95%.
3. Place patient in the left lateral recumbent position and decrease sensory stimulation as much as possible in transport and minimized postural supine hypotension syndrome.
4. Large bore IV access. Total hourly intake is usually limited to between 100 and 125ml.
5. Monitor cardiac rhythm, maternal vital signs, deep tendon reflexes, and fetal heart rate by doppler, q 15 min (if available).
6. Magnesium Sulfate is used for prevention of seizures.
   a. DOSAGE: 4 grams Magnesium Sulfate in 50 ml or NS and administer over 10 minutes. Follow this with a drip (concentration of 1gm = 25ml, for example 4gm in 100 ml), and begin continuous infusion at 2gm per hour. This may need to be increased if seizure occurs or in the presence of hyperreflexia.

IMPORTANT: Patients that are transported on Magnesium Sulfate drips must be on cardiac monitoring for the duration of the transport.

Note: Calcium Gluconate is used for reversal of Magnesium Sulfate when signs of Magnesium toxicity are present.
7. Magnesium Toxicity:
   a. Absent reflexes:
      i. Stop Magnesium
   b. Respiratory or Cardiac depression:
      i. Stop Magnesium
      ii. Calcium gluconate 1gm IV over 10 minutes
10. Seizure activity should be treated with supportive care first:
    a. Treatment of choice is to load on Magnesium Sulfate 4-6g bolus, then a continuous
       infusion of 1-2g/hour, unless physician prefers Phenytoin.
    b. Phenytoin 18-20mg/kg IV @ 12.5-25 mg/min (slower than usual dose due to altered
       protein binding).
    c. Lorazepam 1-2mg slow IV repeated q 5 minutes up to a total dose of 20mg if seizures
       last greater than 2 minutes.
11. Cerebral edema may be minimized by mild hyperventilation if the patient is intubated.
12. Consult with physician if considering an antihypertensive agent. Nicardipine or Labetalol can
    be used to control blood pressures greater than or equal to 110 diastolic. The goal is to keep the
    diastolic pressure at approximately 90 to 105mmHg and the systolic around 160mmHg. Avoid
    diastolic pressure of less than 90. Refer to Protocol 4.13 Hypertensive Emergencies
10. Avoid the use of diuretics.
11. If acute pulmonary edema is present with respiratory distress consider:
    a. Head of bed up
    b. Airway intervention with positive pressure ventilation
    c. Consider Furosemide but use ONLY WITH PHYSICIAN CONSULT (20-40mg IV over 2 to
       4 minutes).
INDICATIONS: Preterm Labor is defined as regular and rhythmic contractions that produce cervical changes after the 20th week of gestation and prior to the 37th week of gestation. The cause cannot always be identified.

PROCEDURE:

1. Prepare for imminent delivery.

2. Assess and manage airway, breathing and circulation.

3. Initiate cardiac monitoring, pulse oximetry and serial vital signs.

4. Administer oxygen 2 to 4L/nasal cannula or 6-10L/mask as indicated to maintain SpO2 > 95%.

5. Maintain left lateral recumbent position, not only to improve uterine perfusion and decrease uterine irritability, but to decrease pressure on the cervix from the presenting part. Avoid letting the patient sit or bend to avoid pressure on the cervix during transport.

6. Initiate or maintain IV access and volume resuscitate as appropriate. In general you can infuse 125ml per hour of NS. Contractions can be caused by dehydration in the mother so a 250ml or 500ml bolus may be considered prior to tocolytic therapy when there is history of fluid depletion.

7. Monitor contraction frequency and duration. Avoid vaginal exams if the membranes are ruptured unless delivery is imminent or fetal bradycardia develops.

8. Emotional support to the mother and family. This may include coaching the mother with breathing during contractions.

9. Be prepared for delivery.

10. You may be asked to continue antibiotics as initiated at the referring institution.

11. Antepartum steroids may have been administered to the patient prior to your arrival to accelerate fetal lung maturity.
12. Terbutaline- 0.25mg SQ q 20 minutes until total of 0.75mg;

   a. Hold if maternal pulse >120.

13. Magnesium Sulfate: Mix 4 grams Magnesium Sulfate in 50 ml NS and administer over 20 minutes. Follow this with a drip (concentration of 1 gram=25ml, for example 4gm in 100 ml), and begin infusion at 2gm per hour. May increase by 1.0gm/hr every 60 minutes for persistent contraction. Observe for magnesium toxicity (see below).

   Note: Calcium Gluconate is used for the reversal of Magnesium Sulfate when signs of Magnesium toxicity are present. Signs of Magnesium Sulfate toxicity are respirations decreased to 12 per minute or less, decreasing or absent deep tendon reflexes, or extreme muscular weakness.

14. If Magnesium Toxicity is present, consider Calcium Gluconate:

   a. 1gm of 10% solution IV over 10 minutes.

15. Additional dose, dependent on patient condition may be administered 10 minutes after initial dose.

16. Magnesium Toxicity:

   a. Absent reflexes:
      i. Stop Magnesium

   b. Respiratory depression:
      i. Stop Magnesium,
      ii. Administer Calcium gluconate 1g of 10% over 10 minutes

   c. Cardiac depression:
      i. Stop Magnesium
      ii. Administer Calcium gluconate 1g of 10% over 10 minutes
Medical Transport, LLC

Policy Number: 9.6

Section/ Section Code: Patient Care Guidelines (PCG)

Subject: Premature Rupture of Membranes

Creation Date: February 14, 2016

Revision Date: July 6, 2018

Affected Departments: All Departments

Pages: 1

Effective Date:

INDICATIONS: Rupture of the amniotic membranes in a pregnancy of preterm gestation (prior to 37 weeks gestational age).

PROCEDURE:

1. Assess and manage airway, breathing and circulation.

2. Administer oxygen 2 to 4L/cannula or 6-10L/mask as indicated to maintain SpO2 > 95%.

3. Initiate cardiac monitoring, pulse oximetry and serial vital signs.

4. Maintain left lateral recumbent position, not only to improve uterine perfusion and decrease uterine irritability, but to decrease pressure on the cervix from the presenting part. Avoid letting the patient sit or bend to avoid pressure on the cervix during transport.

5. Initiate or maintain IV access and maintain 0.9% Normal Saline at a maintenance rate.

6. Monitor contraction frequency and duration. Avoid vaginal exams if the membranes are ruptured unless delivery is imminent or fetal bradycardia develops.

7. The use of tocolytics is controversial. Generally, they may be administered to facilitate transport to an appropriate care facility or until a course of steroids is complete. See previous discussion regarding use of tocolytics. (Protocol 9.4)

8. You may be asked to continue antibiotics as initiated at the referring institution.

9. Antepartum steroids may have been administered to the patient prior to your arrival to accelerate fetal lung maturity.

10. Remember the major complication associated with pre-term labor is delivery of an immature fetus. Be prepared for delivery and resuscitation should it occur.

11. Emotional support to the mother and family.
INDICATIONS: Any trauma, no matter how minor, blunt or penetrating, during pregnancy.

PROCEDURE:

1. Initiate trauma care as outline in the Regional Trauma Protocol Section.

2. Assess and manage airway, breathing and circulation.

3. Airway management as indicated. Administer supplemental O₂ to maintain SaO₂ between 94-99%.

4. The pregnant trauma patient should have spinal immobilization as indicated for any trauma patient. The board should be tilted to the left with blankets to avoid compression of the great vessels.

5. Initiate or maintain at least 2 large bore IV’s with NS infusing. Vigorous volume resuscitation as indicated. Avoid hypovolemia as fetus will be compromised early due to uterine vasoconstriction to shunt blood to vital maternal organs. Request packed red blood cells from transferring hospitals if indicated.

6. Assure monitoring of cardiac rhythm, maternal vital signs, fetal movement (if mother can speak), fetal heart rate (if available), oxygen saturation and ETCO₂.

7. If uncontrollable vaginal bleeding and shock are present or if there are signs of a non-reassuring fetal heart rate, emergent Cesarean Section may be indicated immediately on arrival at the receiving facility. Contact the receiving facility as soon as possible.

8. A modification of CPR in Pregnancy is the left lateral tilt position. The recommendation for drugs is to use standard doses.
INDICATIONS: In general, transport should NOT be considered if delivery is imminent or likely to occur during transport. Caution should be used in patients that are actively laboring:

1. Multiparous patients
   a. Cervix dilated 3-4cm or more with active labor and a substantially effaced cervix
   b. Contractions less than 5 minutes apart
   c. History of rapidly progressing labor

2. Primiparous patients
   a. Cervix substantially thinned and dilated 4cm or more with active labor
   b. Contractions less than 5 minutes apart

3. GUIDELINES FOR UNPLANNED DELIVERY:
   a. Vertex Delivery (head presentation)
      i. Position the Mother appropriately. Put a towel underneath her buttocks so that you can pull down to deliver the shoulders of the baby. Put sterile gloves on and drape the delivery area with a sterile towel. Have bulb suction, clamps, and sterile scissors within reach.
      ii. Give reassurance to the mother and encourage her to take slow deep breaths between contractions, and to pant with contractions.
      iii. When there is pressure on the perineum gently support it with one hand. If the amniotic sac is still intact, rupture the membrane.
      iv. Support the infant’s head as it emerges and rotates externally. Wipe the face gently and aspirate mucus from the mouth and throat with a bulb syringe. After
suctioning the mouth, gently suction the nose with the bulb aspirator. Check the infant’s neck for coils of umbilical cord. If it is coiled around the neck tightly and cannot be slipped over the head, it must be clamped doubly, and cut between the clamps, and then unwound.

v. During a uterine contraction gently grasp the baby’s head and depress it towards the rectum. This enables the anterior shoulder to emerge under the symphysis pubis. Next raise the head and the posterior shoulder can be born over the perineum.

vi. Keeping the infant below the level of the placenta, tie or clamp the cord at least eight inches from the infant’s navel. Use two clamps or ties placed two inches apart. Cut the cord between the clamps or ties and examine the ends to be sure there is no bleeding.

vii. Dry and wrap the infant in a blanket; if the infant’s and mother’s conditions are stable, the mother can hold the baby.

viii. Delivery of the placenta should occur within thirty minutes after the delivery of the infant. Apply gentle traction on the umbilical cord to deliver the placenta. Do not pull.

1. Signs of placental separation include:
   a. Lengthening of the cord, gush of bright red blood
   b. The fundus rises up in the abdomen.

ix. Apply direct pressure to any tears of the perineum that may be bleeding. If bleeding is suspected other than a perineal tear, massage the fundus of the uterus. If bleeding is not excessive then massage the fundus every 15 minutes.

Evaluation/Management of the Infant

1. Suction the oropharynx first, then both nares with the bulb syringe when the head is delivered.

2. If meconium is present, after the delivery the laryngoscope is employed to see whether there is meconium at or below the level of the vocal cords.
   a. If there is any meconium it should be suctioned out before any resuscitative measures are done, especially positive pressure ventilations.
   b. Suction with multiple times until the tube is clear of meconium.

3. Administer blow-by 100% O₂ until the baby is pink centrally. Support ventilations if the apical
rate is less than 100 and/or respirations are absent or depressed.

4. Maintain body temperature.

5. Initiate cardiac compressions of > than 100/minute if the apical rate is less than 80 per minute.

6. If drug therapy or volume resuscitation is indicated, consider cannulating the umbilical vein for vascular access.

7. APGAR scores should be noted at one and five minutes after birth. +

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance, Color</td>
<td>Blue, Pale</td>
<td>Centrally pink</td>
<td>Completely pink</td>
</tr>
<tr>
<td>Pulse, Heart rate</td>
<td>None</td>
<td>Less than 100</td>
<td>Greater than 100</td>
</tr>
<tr>
<td>Grimace, reflex</td>
<td>No response</td>
<td>Grimace</td>
<td>Cough, gag, cry</td>
</tr>
<tr>
<td>Activity, attitude</td>
<td>Flaccid/ limp</td>
<td>Some flexion</td>
<td>Well flexed/ active</td>
</tr>
<tr>
<td>Respiratory effort</td>
<td>None</td>
<td>Weak, irregular</td>
<td>Good, crying</td>
</tr>
</tbody>
</table>
INDICATIONS: For use in management of patients experiencing a complicated delivery

1. Breech Presentation (buttocks) or feet presentation):
   a. If delivery is in progress, allow the buttocks and trunk of the baby to deliver spontaneously. Direct the mother to push with contractions.
   b. Once the legs and arms are delivered, support the body on the palm of your hand and insert your finger into the baby’s mouth and bring the chin down to allow the head to deliver. Have an assistant provide supra-pubic pressure to facilitate delivery of the head.

2. Shoulder Dystocia (the situation in which the head has been born but the shoulders cannot be delivered by the usual methods)
   a. Place the patient in a semi-Fowler position. The patient’s legs are flexed, with the knees pulled back up onto the thighs. Hips are abducted out as much as possible increasing the AP diameter of the pelvis
   b. Suprapubic pressure can be used to attempt and push the anterior shoulder under the symphysis bone. Do not use fundal pressure.
   c. Consider reaching into the vagina to deliver the anterior shoulder by trying to rotate it into the pelvis, extraction of the posterior arm, or using a corkscrew maneuver to rotate the shoulders out of the pelvis.
   d. Delivery of anterior shoulder must occur within several minutes.

3. Prolapsed Cord: The umbilical cord lies beside or below the presenting part. Compression of the umbilical cord between the presenting part and the maternal pelvis reduces or cuts off the blood supply of the fetus and if uncorrected leads to fetal death. If fetal bradycardia occurs after rupture of the membranes, prolapsed cord should be considered. A diagnosis is made by seeing the cord either outside of, or in the, vagina; or feeling the cord on exam.
   a. Place a hand in the vagina and push and hold the presenting part up and away from the cord. Maintain until patient is in the operating room. Alternatively, the bladder may be filled via Foley catheter to maintain the head in a favorable position. Minimize
manipulation of the cord. At the same time preparations are made for delivery.

b. The woman is placed in the knee-chest or Trendelenburg position, with the hips elevated and the head low. Oxygen by NRB to the Mother.

c. Fetal heart rate is checked by Doppler (if available), and may possibly be palpated in the cord.

d. Terbutaline 0.25mg SQ as a tocolytic agent, to decrease frequency of contractions. If the baby is okay and the cord is protruding out of the vagina, gauze with sterile saline may be placed on it.

4. Amniotic Fluid Embolus: Amniotic fluid embolus occurs when amniotic fluid gains access to the maternal circulation during labor or delivery resulting in obstruction of the pulmonary vasculature. In addition to the actual amniotic fluid causing emboli, particulate matter such as meconium, lanugo hairs, fetal squamous cells, bile, fat, and mucin may also cause pulmonary emboli.

   a. Maintain airway and supplemental ventilation and oxygen as indicated. PEEP may be indicated beginning at 5cm.

   b. Two large bore IV’s and fluid resuscitate as needed.

   c. Monitor mother and fetus frequently and treat mother’s symptoms as indicated.

   d. Watch for evidence of D.I.C.

5. Post-Partum Hemorrhage: (PPH) Continuous bleeding after delivery.

   a. Fundal massage

   b. Bimanual uterine massage

   c. Observe and treat for hemorrhagic shock

   d. Oxytocin 20 units added to 1000ml of NS and delivered at 300ml/hr.

   e. If bleeding continues administer Prostaglandin (15 methyl prostaglandin F2 alpha) 250ug IM. (contraindicated in asthma) may be ordered for transport.

   f. If bleeding continues consider: Misoprostol/Cytotech 1000mcg PR (if available).

6. Lacerations (cervical or perineal)

   a. Direct pressure until it can be repaired
b. Fluid resuscitation as indicated

7. Uterine Rupture

   a. Monitor and treat for hemorrhagic shock

   b. Consider requesting Oxytocin 20 units IM. If bleeding continues request Oxytocin 20-40 units in 1000ml of NS at 200-300ml per hour. Increase rate at 15-30 minute intervals.
Goal: Once identified, the ruptured ectopic pregnancy is a true obstetrical emergency. Patients must be transported to a center where an emergent exploratory laparotomy can be completed to correct this potential source of bleeding.

Procedure:

1. Assess and manage airway, breathing and circulation.

2. Provide supplemental oxygen to maintain SpO2 94-99%.

3. 2 large bore IV’s, with NSS infusing as needed for hypovolemia.

4. Obtain PRBC’s from referring facility if available, and transfuse as needed.

5. Keep head of patient flat, if hypotensive.

6. Notify receiving facility of patient condition, and need for emergent operative intervention.

7. Keep patient NPO. Decompress stomach with NGT as needed.
## Purpose:
To describe the process of appropriate medication administration by the Medical Transport, LLC transport crew.

## Policy:
1. For any medical presentation, which requires the appropriate administration of a medication to improve or maintain the patient’s condition.
2. The ambulance must be stocked with adequate medical supplies and medications to provide the care required for the patient’s condition.
3. In addition to the required equipment, extra supplies should be tailored for the anticipated needs of the patient. For example, if a patient requires breathing treatments during transport, additional nebulizer setups and extra or multi-doses of the medication should be obtained from the sending facility.

## Precautions:
1. All medications have an optimal route of administration. The most appropriate route is selected based on the patient condition and the clinician’s evidence based practice. Do not hesitate to verify relevant medication data prior to administration.
2. Make certain that the medication you want to give is appropriate and dose modified for the patient status. Always double check medication before administration.
3. IV/IO routes should be used almost exclusively in the air. IM and SC routes are unpredictable. Medications are absorbed erratically via these routes and may not be absorbed at all if the patient is seriously ill and severely vasoconstricted. If an IV/IO cannot be started, some medications can be given via endotracheal tube as an alternative.
4. Patient allergies are often not well documented in transfer notes, thus it is paramount that the Advanced Provider obtains and documents any known allergies prior to the administration of any drug.

## Considerations and Special Notes:
1. Local extravasation during IV medication injection, particularly with calcium or dextrose may cause tissue necrosis. Watch carefully and be ready to stop injection immediately.
2. Allergic and anaphylactic reactions occur more rapidly with IV injections, but may occur with medication administration by any route.
3. Several medications are carried in different concentrations in the drug box; be sure that the concentration of the medication being delivered is appropriate.
4. Know the drugs carried in the Regional drug boxes. Take the time to memorize the drugs carried, the concentration, and note the expiration date.
6. Always double check dosage prior to administration. For narcotics and vasopressors, a second provider should verify correct dose (if available).

**Documentation on Patient Record:**

1. When any medication is administered to a patient in the care of the Advanced Provider, the following data needs to be clearly documented in the PCR:
   a. Indication for medication
   b. Initial of member who actually administered the medication
   c. Time of administration
   d. Medication and dosage
   e. Route of administration
   f. Response to medication
Pharmacology and Action:

1. Two types of solutions are available for use in the transport setting.
   a. Crystalloid: (i.e. normal saline). All contain sodium and expand the extracellular fluid space. Normal saline is slightly hypertonic. Patients with acute hypovolemia are relatively hyperglycemic and do not need the added glucose. Only 20% of infused NS will remain in the vascular space.
   b. Water solutions: (i.e. D5W) will diffuse from the intravascular space to the interstitial space 3 times faster than a crystalloid-type solution. Dextrose is rapidly metabolized and provides little energy for the body to use. The net effect is the addition of free water to the patient.
   c. Occasionally, you will transport a patient with colloids infusing. Refer to the sending hospital's guidelines for administration and adjust your care accordingly. The most commonly seen colloids are Albumin, Hetastarch and Dextran. Blood products are also considered colloids.

Indications:

1. Crystalloid is employed to expand intravascular volume in the setting of shock or hypotension. It is also useful as a route for IV medications and is generally compatible with most medications.
2. Water solutions are the preferred fluid to mix IV infusion drugs for administration.
3. The goals of fluid therapy are to maintain an adequate state of hydration and tissue perfusion with electrolyte balance. The adequacy of fluid therapy can be followed clinically by observation of vital signs, physical examination, and the accurate measurement of input and output.

Precautions:

1. Volume expansion with a crystalloid and blood products is the treatment of choice. Volume expanders alone are not as efficient in raising intravascular volume and do not increase oxygen carrying capacity.
   a. Volume overload is a constant danger particularly in the elderly, in patients with pulmonary or cardiac disease, and in children. Regulate fluid administration in these patient population groups with an infusion pump. Monitor breath sounds and SpO2 during transport.
   b. The total volume infused must be recorded.
Administration:
Choose the largest gauge needle that you can safely establish in a patient. The larger the needle, in general, the better, but any IV that runs is better than multiple attempts with no running IV.

1. All IVs should be run at KVO (with documentation of actual rate) unless additional fluid is indicated or ordered. Any fluid challenge must be documented on the PFR. This should include any changes in the patient’s status. The dose of a fluid challenge shall be individualized to patient status and desired outcome.

2. All patients should be monitored closely for signs of fluid overload.
Purpose:
Describes the appropriate management of a patient that is being transported on a PCA pump.

Policy:
All Medical Transport Advanced Providers expected to recognize and appropriately treat a patient with allergic reaction or anaphylaxis from medications on a PCA pump.

Specific Information Needed:
1. Name of medication being transported in the PCA pump.
2. Dose of medication: Basal rate and Bolus rate must be documented separately
3. Duration or initiation date of PCA pump

Specific Objective Findings:
1. Patient must be observed for any type of allergic reactions
   a. If an allergic reaction is noted:
      i. the Advanced Provider must disconnect the tubing from the patient (The PCA pumps are locked, and the provider will not have access to turn off the pump).
      ii. Treat the patient per Protocol 4.14 Allergic Reaction/ Anaphylaxis

Treatment Protocol:
1. Treat ABC’s
2. Administer moderate to high flow O2 based on oxygen needs to maintain SPO2 94-99%
Intubation Tips

**PREPARATION**: Four Cornerstones Minimum requirements for emergency intubation:

1. Laryngoscope with both straight and curved blades
2. ET tube with backup tube size
3. Suction
4. Bougie (if available)

**Failed Airway Options**

Minimum requirements for emergency intubation:

1. Supraglottic airway (e.g. - King, LMA)
2. Surgical airway kit

Position=HELP

Head Elevated Laryngoscopic Position

**LARYNGOSCOPY**

**Wide View Laryngoscopy (“heads up”)**

Keep your own eyes up and away from the patient’s face. Although some would argue that true binocular vision does not always occur or is not always necessary, the “heads up” position generally provides optimum vision because it increases the focal distance to the cords. The importance of focal distance is illustrated when intubating patients while sitting on the floor and behind the patient’s head; keeping your own head up and away from the patient provides an optimum focal distance and visual field for intubation. The other advantage of the “wide view” (“heads up”) position is that it allows the laryngoscopist to see more than the cords in the visual field – an important concept in managing most emergency intubations in uncontrolled conditions.
Bimanual Laryngoscopy (“two hands”)

Use both hands to find the cords. While one hand holds the laryngoscope, the other should be kept free to open the mouth, remove teeth and foreign material, help control the tongue, etc. During RSI, cricoid pressure is generally applied by an assistant. If the view of the cords (POGO) still needs to be improved, that can best be done by the laryngoscopist him/herself, again as long as the second hand remains free. External Laryngeal Manipulation (ELM) can be done by the laryngoscopist to improve the POGO score as needed. Once optimal POGO is obtained, the assistant then takes over cricoid pressure in the “new and improved” position. “Hand over hand” is a variation of this technique.

Incremental Laryngoscopy (“walk the tongue”)

Emergency airway management generally involves unscreened patients with a variety of anatomical variations, including the “ugly airway.” In this technique, the laryngoscope is progressively and carefully moved through the pharynx in increments, identifying anatomical landmarks and variations along the way (“walking the tongue”). When the epiglottis has been identified, the tip of the blade is then placed in correct position in relation to the epiglottis. Finding anatomical landmarks and proper placement of the laryngoscope blade should not be hurried, and should be expected to take at least 5-10 seconds in most unscreened patients. Only after landmarks have been identified, and the blade optimally placed in relation to the epiglottis, should any significant pressure be applied to open the airway with the laryngoscope blade. If the cords are then sufficiently visible enough to confidently pass the ETT or bougie, one of these is then passed and the intubation is completed.

If landmarks are still uncertain at this point, however, consider removing the laryngoscope blade completely, and making some adjustments before proceeding further. In a truly difficult airway, it is generally good practice to anticipate this kind of “orientation pass” and to make these changes now, rather than to continue further into unknown territory. Possible helpful adjustments might include ELM (see below), changing head position (“sniff,” “ramp,” and HELP), use of suction or forceps to remove foreign material, use of the rigid suction tip as probe, changing blade type (curved vs straight vs Howland lock), etc.

The point is to take the necessary time to identify landmarks, and proceed carefully in increments when challenged by a truly difficult emergency airway.

Bougie Tips (If available)

Perspective on bougies

The gum elastic bougie (Eschmann, “tube changer,” etc.) is a practical and effective first-line device for securing even extremely difficult airways, particularly in the presence of blood, vomitus, or anatomic deformities. It can generally be placed by direct vision easier than a cuffed ET tube, and can often be placed by “feel” of the tracheal rings even when anatomic structures are obscured. "If the ET tube cannot be quickly and confidently passed through the cords under direct vision, it is generally best to first pass the bougie to secure tracheal placement, then pass the ET tube over the bougie."

Select the right bougie

All bougies are not equally effective. Select one that is stiff enough, even at the high temperatures that
might be found in an ambulance a hot day.

**Shape the bougie**

Bougies tend to take on the shape of their packaging. When coiled in a small pack, for example, the bougie will need to be appropriately shaped before use. Note that bougies all have “short term memory” and can be re-shaped quickly and easily.

**Rotate to feel rings**

Tracheal rings are usually easy to identify when the bougie is in the trachea, with the coude’ tip angled anteriorly, toward the front of the trachea. However, sometimes it is necessary to rotate the bougie tip through 180 degrees to get the best “feel” of the rings, even when the bougie is correctly placed.

**Rotate to pass obstructions**

Even when correctly placed in the larynx, the bougie can still hang up on anatomical structures, such as the true vocal cords and the anterior commissure. When encountering an obstruction, back the bougie a bit, and rotate gently (“back and roll”) to walk the tip past the obstruction.

**Troubleshoot with laryngoscope**

The laryngoscope can be used as a “troubleshooting tool” for a variety of situations during intubation. When difficulties occur in passing the bougie through the cords, particularly when passing the bougie by feel in a “blind” procedure, the laryngoscope can often be used to help provide some helpful orientation to the position of glottic structures and to the position of the bougie tip, even if the cords themselves cannot be seen.

**Bury the bougie**

The tip of the gum elastic bougie (and its plastic variations) is generally considered to be an atraumatic tip if handled gently and carefully. After the trachea is identified, place the bougie deep into the trachea. This prevents flipping the tip out of the trachea and into the esophagus when the ET tube is guided “around the corner” of the pharynx.

**Afterload the tube**

It is generally best to afterload the bougie with an ET tube, after it is placed and confirmed in the trachea. Preloading might save a few seconds, but that kind of time savings is not generally significant. More importantly, preloading the ET tube interferes with the proper “feel” of the bougie tip on the tracheal rings, and also interferes with rotation of the bougie tip.

**Control the bougie when loading**

If the bougie tip were to be placed just beyond the cords, it would be necessary to use the second hand at the mouth to firmly stabilize bougie in the trachea when loading the ET tube. This makes afterloading...
the ET tube difficult, since the proximal end of the bougie is not well stabilized. If the patient is sedated and paralyzed during RSI, however, and the bougie is placed deep in the trachea (“bury the bougie”), the second hand can adequately stabilize the bougie at the proximal end. This makes loading the ET tube much faster and easier.

**Straighten the airway**

Once the ET tube is loaded over the bougie, it must now be guided around the angle of the pharynx at the base of the tongue. Straightening the airway makes this step much easier and quicker. The airway can be straightened with the second hand by using a laryngoscope (even without the light), or by simply lifting the tongue and jaw with the thumb of a gloved hand.

**Passing obstructions**

Even when properly placed, the ET tube can still hang up on anatomic structures, much the same as the bougie. And as with the bougie, the tip of the ET tube can sometimes be moved back and rotated (“back and roll”) to clear the obstruction. And as with any type of cuffed tube, a gentle reciprocating action is generally helpful, and can be combined with rotation.

**Troubleshoot with laryngoscope**

Just as the laryngoscope can be used as a “troubleshooting tool” when passing the bougie, it can also be used to navigate through obstructions that might be encountered when passing the tube over the bougie. Not only does it provide some visual orientation, it also helps to straighten the airway.

**Feel the tube pass**

Whether or not a bougie is used first for placement, the passing of the ET tube cuff through the larynx can generally be felt by the assistant who is holding cricoid pressure.
# Pediatric Drug Reference

## Resuscitation

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atropine</td>
<td>0.02 mg/kg (min 0.1mg)</td>
</tr>
<tr>
<td>Dextrose</td>
<td>10% 5-10 ml/kg (&lt;25kg)</td>
</tr>
<tr>
<td>Dextrose</td>
<td>25% 2-4 ml/kg (&lt;35kg)</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>0.01 mg/kg</td>
</tr>
<tr>
<td>Na Bicarb</td>
<td>1 mEq/kg (4.2%&lt;10kg)</td>
</tr>
<tr>
<td>IV Bolus</td>
<td>20 ml/kg</td>
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<tr>
<td>Magnesium</td>
<td>25-50 mg/kg</td>
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<tr>
<td>Naloxone</td>
<td>0.1 mg/kg max 2 mg.</td>
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</table>

## RSI

<table>
<thead>
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<th>Drug</th>
<th>Dosage</th>
</tr>
</thead>
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<tr>
<td>Ativan</td>
<td>0.05-0.1 mg/kg</td>
</tr>
<tr>
<td>Atropine</td>
<td>0.02 mg/kg (min 0.1mg)</td>
</tr>
<tr>
<td>Etomidate</td>
<td>0.3 mg/kg</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>1-2 mcg/kg</td>
</tr>
<tr>
<td>Ketamine</td>
<td>1-2 mg/kg</td>
</tr>
<tr>
<td>Midazolam</td>
<td>0.05-0.1 mg/kg</td>
</tr>
<tr>
<td>Propofol</td>
<td>2 mg/kg</td>
</tr>
<tr>
<td>Rocuronium</td>
<td>1.2 mg/kg</td>
</tr>
<tr>
<td>Succinylcholine</td>
<td>1-2 mg/kg</td>
</tr>
<tr>
<td>Vecuronium</td>
<td>0.1-0.2 mg/kg</td>
</tr>
</tbody>
</table>

## Vasopressors/Inotropes

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dopamine</td>
<td>2-20 mcg/kg/min [150mg/250NS]</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>2-20 mcg/kg/min [150mg/250NS]</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>0.1-1.0 mcg/kg/min [1.5mg/250NS]</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>0.05-2.0 mcg/kg/min [1.5mg/250NS]</td>
</tr>
<tr>
<td>Phenylephrine</td>
<td>0.1-1.0 mcg/kg/min [10mg/250D5%]</td>
</tr>
<tr>
<td>Vasopressin</td>
<td>0.3-2.0 mU/kg/min [40mg/100NS]</td>
</tr>
</tbody>
</table>

## Cardiac

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenosine</td>
<td>0.1 mg/kg (0.2/k 2nd dose)</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>5 mg/kg</td>
</tr>
<tr>
<td>Calcium Gluc.</td>
<td>50-100 mg/kg</td>
</tr>
<tr>
<td>Prostaglandin</td>
<td>0.05-0.1mcg/kg/min [500mcg in 49ml D5%]</td>
</tr>
</tbody>
</table>

## Neuro

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mannitol</td>
<td>0.25-1 Gm/kg</td>
</tr>
<tr>
<td>Morphine</td>
<td>0.1 mg/kg</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>15-20 mg/kg slow</td>
</tr>
<tr>
<td>Fosphenytoin</td>
<td>15-20 mg/kg</td>
</tr>
</tbody>
</table>

## Respiratory

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium</td>
<td>75 mg/kg, over 20min</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>2 mg/kg load</td>
</tr>
</tbody>
</table>