

APPENDIX

Policy: 10
Date: 4/1/97

END-TIDAL CO₂ MONITORING DEVICES

1. End-tidal CO₂, the amount of CO₂ in the airway at the end of the breath, may be used to evaluate the effectiveness of CPR. End-tidal CO₂ drops during cardiac arrest, increases moderately with effective chest compressions and increases significantly when the heart begins pumping effectively. Studies suggest that monitoring end-tidal CO₂ may aid in:

- Confirming endotracheal intubation;
- Monitoring the effectiveness of chest compressions and gas exchange;
- Identifying the return of an effective heartbeat (spontaneous circulation)

2. The following are guidelines for interpreting ET CO₂ colors:

- **Purple ('A' Range)**

Pneumonic: “Pull it” or “Poor”

Indicates a problem requiring *immediate* attention. Do **not** automatically assume that the ET CO₂ monitor is not working correctly. First visualize the vocal cords to determine whether the tube is in the trachea and then assess the adequacy of CPR or bag-valve ventilations. If color remains purple after reassessment, pull the endotracheal tube and hyperventilate with bag-valve-mask device.

NOTE: In cardiac arrest patients, if the ET CO₂ device remains purple, assess endotracheal tube placement by direct visualization. If correctly placed, DO NOT pull the tube. Purple color may be due to poor gas exchange on the cellular level from the cardiopulmonary arrest.

- **Tan ('B' Range)**

Pneumonic: “Think about it” or “Trouble”

This indicates a moderately low detected CO₂. This level is commonly seen during CPR and in patient with very low blood pressure. Assess ventilations to assure that tube is in the trachea. If color remains tan, low blood flow to the lungs may be the cause. Continue to reassess frequently.

- **Yellow ('C' Range)**

Pneumonic: “Yes!”

Indicates normal or low-normal readings. The endotracheal tube is adequately ventilating the patient, chest compressions are adequate and effective gas exchange is occurring.

3. Adult, pediatric and pre-attached CO₂ monitors all use the same color scheme.

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ET INTRODUCING STYLET

1. The purpose of this policy is to define the indications, contraindications, and procedure for the use of the ET tube introducing stylet.
2. The following conditions may be indicators for the use of the ET tube introducing stylet:
 - Apneic patients, unable to visualize vocal cords.
 - Apneic patients with airway edema regardless of laryngeal view.
 - Apneic patients with anatomic conditions which preclude either adequate visualization or intubation by conventional means.
3. DO NOT use with endotracheal tubes smaller than 6.0.
4. Complications of the ET tube introducing stylet may include:
 - Tracheal/esophageal perforation
 - Hemopneumothorax
 - Mediastinal emphysema
 - Right-sided pneumothorax
 - Right mainstem intubation
5. The following procedure should be done:
 - 5.1 Perform laryngoscopy as per oral tracheal intubation procedure, and obtain the best possible laryngeal view.
 - 5.2 While holding ET tube introducing stylet in right hand with the angled tip pointing upward, gently advance the ET tube introducer anteriorly (under the epiglottis) to the glottic opening (cords).
 - 5.2.1 If able to visualize the vocal cords, direct through the cords.
 - 5.2.2 If unable to visualize cords, direct the ET tube introducer to the area where the cords should be, and feel for a “washboard” sensation as the stylet tip ratchets on the tracheal rings.
 - 5.3 Gently advance the device until resistance is encountered (at the carina).
 - 5.3.1 NEVER force the stylet, as pharyngeal/tracheal perforation can occur.
 - 5.3.2 **If no resistance is encountered and the entire length of the introducing stylet is inserted, the device is in the esophagus.**
 - 5.4 The stylet is correctly placed when the device can be seen going through the cords, when ratcheting of the tip on the tracheal rings is felt, and/or when resistance is met after advancing (stylet is at the carina).
 - 5.4.1 When using a marked stylet, withdraw the stylet back until the black line (or other such mark) is at the lips prior to advancing the ET tube, indicating distal tip is beyond vocal cords and proximal end has enough length to slide ET tube over it.
 - 5.5 Once the stylet is positioned, advance the ET tube over the stylet and into the trachea.
 - 5.6 If resistance encountered, withdraw the ET tube slightly, rotate 90 degrees and re-attempt. If unsuccessful, attempt with a smaller tube.

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- 5.7 Once the ET tube is placed, maintain tube placement while removing introducer stylet.
- 5.8 Because this is a blind intubation, ETCO₂ or waveform capnography **must** be present to confirm tracheal placement.

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INTRANASAL ADMINISTRATION OF MEDICATIONS

1. The intranasal (IN) route is to be used as an optional route of medication administration.
2. Contraindications to intranasal administration include:
 - facial trauma
 - epistaxis
 - nasal congestion or discharge
 - any recognized nasal mucosal abnormality
 - 2.1 Relative contraindications include:
 - patient's prior use of vasoconstrictors - ex. antihistamines, cocaine
3. No more than one 1ml of medication should be administered per nostril for adults.
No more than 0.5ml of medication should be administered per nostril for children ten (10) years of age or under.
 - 3.1 Patient may be in any position for medication administration.
 - 3.2 Appropriate concentration of drug for intranasal administration must be used.
4. Approved medications/concentrations for intranasal administration:
 - midazolam (Versed) 5mg/ml
 - naloxone (Narcan) 1mg/ml
 - 4.1 If administering midazolam for seizure control, once seizure activity has stopped or lessened, an IV should be established for future medication administration.
5. Use of intranasal atomizing device
 - 5.1 Draw up appropriate medication into a 1ml or 3ml luer-lock syringe
 - 5.2 Expel any air within the syringe
 - 5.3 Attach atomizing device to syringe – be sure it is secured firmly to syringe
 - 5.4 Briskly compress the syringe plunger to expel and atomize medication

INTRAOSSUEOUS INFUSIONS

1. Intraosseous vascular access can be utilized in critical patients when IV therapy is indicated and peripheral venipuncture attempts have failed. These may include, but are not limited to:
 - Shock from any cause
 - Cardiac arrest
2. Contraindications for intraosseous infusions are:
 - Fracture of the target bone
 - Infection over target site
 - Neonate - not recommended; if required, use extreme caution
3. Intraosseous access may be done prior to contact on
 - unconscious pediatric patients
 - adult patients in full arrest, asystole, or PEA
 - unconscious adults with a perilyngeal airway placed, after 2 failed IV attempts (reference policies # 25, King Airway, and #28, MLA) -- requires a base hospital order for all other adult patients.
4. The following procedure should be followed when plain IO needles are used:
 - 4.1 Assemble and prepare equipment to include: 25 ml normal saline, 20 ml syringe, disposable intraosseous infusion or bone marrow aspiration needle and tape to stabilize needle.
 - 4.2 Select and prep target site, using aseptic technique; the first choice is the proximal tibia. The distal tibia or distal femur may be used following Base Hospital consultation.
 - 4.3 With a twisting motion and downward pressure, insert needle at 90⁰ angle to bone surface at the target site. (**Do not push downward without twisting the needle**).
 - 4.4 Once loss of resistance is felt, slightly advance needle 1-2 mm. further.
 - 4.5 Remove stylet from needle. NOTE: If it is necessary to reposition the needle, the stylet must be reinserted.
5. EMT-Ps using special IO insertion devices
 - 5.1 Follow manufacturer's instructions for assemblage
 - 5.2 Select and prep target site, using aseptic technique; the first choice is the proximal tibia. The distal tibia or distal femur may be used following Base Hospital consultation.
6. Verify intraosseous placement by:
 - 6.1 Note sudden lack of resistance.
 - 6.2 Needle is free standing, without support.
 - 6.3 Aspiration of blood/marrow or ability to infuse without extravasation.
 - 6.4 Attach a 10-20 ml syringe of normal saline and inject 5-10 ml. Look for signs of extravasation.
7. Attach IV set up and watch for flow of solution. Flow without extravasation indicates proper needle placement. Pressure infusion may be needed, even when the IO is properly placed, to achieve the required flow rates. Set IV rate as clinically indicated.

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8. Secure the needle and IV tubing to the patient with tape. Splint limb to prevent dislodgement.
9. Continuously observe for signs of infiltration.
10. Only one (1) intraosseous attempt may be made in the prehospital setting without consulting the base hospital.
11. The EMT-P shall document the procedure on the procedure evaluation form and submit it to the ALS Provider QI Department. This form, with a copy of the PCR attached, shall be submitted to the EMS Agency.

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KING AIRWAY

1. The King Airway is an alternate airway for use by properly trained paramedics in Riverside County, when the placement of an ET tube is not possible or not prudent.
2. This airway is an optional piece of equipment. When chosen, it is used in place of a multi-lumen airway (MLA). Those agencies choosing to utilize the King Airway are required to stock all three sizes for appropriate patient fit, based on patient height --

Patient height	4 ft - 5 ft	-	Size 3 (yellow cap)
	5 ft - 6 ft	-	Size 4 (red cap)
	over 6 ft	-	Size 5 (purple cap)
3. Indications for use of this airway:
 - Unresponsive patients without a gag reflex *and*
 - Adjunctive airway protection and positive pressure ventilation is required *and*
 - Airway protection and/or positive pressure ventilation is inadequate or ineffective by BLS means

Note: when the above indications are met and signs of difficult intubation are present, the King airway should be considered as the initial ALS airway adjunct.
4. Contraindications for use include patients with:
 - an intact gag reflex
 - known esophageal disease
 - probable ingestion of caustic substance(s)
5. Procedure for insertion
 - 5.1 Select the proper tube size. Have a spare tube on stand-by for immediate use.
 - 5.2 While preparing tube, have assistive personnel open the airway, and clear of any foreign objects. Pre-oxygenate with 100% oxygen.
 - 5.3 Test cuff inflation system by injecting the maximum recommended volume of air into the cuffs (size 3 – 60 ml; size 4 – 80 ml; size 5 – 90 ml). Remove all air from both cuffs prior to insertion.
 - 5.4 Apply water-soluble lubricant to the distal tip and posterior aspect (only) of the tube, taking care to avoid introduction of the lubricant into or near the ventilatory openings.
 - 5.5 Position patient into “sniffing position” if possible, otherwise head may be in a neutral position.
 - 5.6 Hold the tube at the colored connector with the dominant hand. With the non-dominant hand, hold open the patient’s mouth and apply a chin lift. (Thumb into oral cavity, index finger under chin)
 - 5.7 Rotate the tube 90° laterally, so that the blue orientation/x-ray line on the inside curve of the airway is touching the outer corner of the mouth, with the tube curving out.
 - 5.8 While advancing the tip of the tube across the tongue to its base, rotate the tube an additional 90° back to midline, so that the blue orientation line now faces the chin.

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- 5.9 Without exerting excessive force, advance the tube until the base of the connector is aligned with the teeth or gums. Be sure to maintain the tip of the tube midline so as to advance it into the upper esophagus and not into the piriform fossa (blind pocket).
 - 5.10 Using a syringe, inflate the cuffs with the minimum volume necessary to seal the airway at the peak ventilatory pressure employed ("just seal" volume). Typical inflation volumes are as follows:
 - Size 3: 45-50 ml
 - Size 4: 60-70 ml
 - Size 5: 70-80 ml
 - 5.11 Attach a BVM. While gently bagging the patient to assess ventilation, carefully withdraw the airway until ventilation is easy and free flowing (large tidal volume with minimal airway pressure).
 - 5.12 Confirm proper position by auscultation, chest movement and verification of CO₂ by waveform capnography or an End Tidal CO₂ Detector. CO₂ monitoring device shall remain in place for continuous monitoring.
 - 5.13 Readjust cuff inflation to new "just seal" volume, taking care not to exceed maximum cuff volume -- 60 ml, 80 ml, 90 ml (see 5.3 above).
 - 5.14 Secure tube to the patient.
6. Document time of placement, recording the final volume of air used and the depth markings (cm) on the tube.
 7. Procedure for removal
Removal of the airway in the field will only occur if the airway malfunctions or the patient's condition changes so as to make an airway adjunct unnecessary (ex. - a deeply hypoglycemic patient becomes conscious).
 - 7.1 Have suction and additional intubation equipment at the ready.
 - 7.2 Deflate tube cuffs completely.
 - 7.3 Remove in a smooth, swift motion.
 - 7.4 Reassess the patients' airway to ensure it is protected.
 - 7.5 Ensure the patient has adequate minute volume and apply supplemental oxygen as needed.
 - 7.6 Record time, reason for tube removal, and how removal was tolerated by the patient.
 8. As part of the quality assurance process, all placements or attempted placements of a King airway will be documented on the Special Procedures form. This form will be submitted, along with a copy of the PCR, to the paramedic's QA coordinator for internal review. The QA coordinator will then forward these materials to the EMS Agency.

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MULTI-LUMEN AIRWAY INTUBATION

1. The purpose of this policy is to define the indications, contraindications and procedure for the utilization of the multi-lumen airway (MLA) in the adult patient.
2. The multi-lumen airway may be used in certain circumstances when airway maintenance is necessary AND
 - endotracheal intubation cannot be performed, OR
 - BVM management is inadequate (see #4 below).
3. MLA intubation is a mandatory skill for paramedics. It is an optional skill for BLS personnel. It may only be performed by those persons having passed an approved training program who are:
 - 3.1 EMT-Is utilizing it in conjunction with defibrillation while working for approved AED service providers, OR
 - 3.2 EMT-Is working with a paramedic partner for an approved ALS provider, OR
 - 3.3 Licensed and accredited paramedics.
4. MLA intubation may be performed only on those patients who meet ALL of the following criteria:
 - are unconscious and without purposeful movement
 - do not have a gag reflex
 - are apneic or have a respiratory rate of <6
 - appear to be at least 16 years old AND at least 4½ feet tall
5. MLAs should not be removed by ALS personnel for endotracheal tube insertion, unless there is a malfunction of the MLA.
6. MLAs may be utilized by ALS personnel as an optional airway tool in lieu of ET intubation or in instances where ET intubation is unsuccessful.
 - 6.1 In the event that an MLA patient requires immediate drug administration and an IV can not be successfully established after 2 attempts, an IO line may be instituted with or without base hospital contact.
7. MLAs must NOT be placed on patients who meet any one of the following criteria:
 - airway can be managed with an upper airway device only - - i.e., OP or NP airway
 - have a positive gag reflex
 - have known esophageal injury, surgery, or disease (e.g., tumor, varices)
 - have a foreign body airway obstruction (FBAO)
 - have a history of laryngectomy with stoma
 - are known narcotic overdoses, with ALS less than 10 minutes away
 - any circumstance where airway edema is suspected or could develop --
 - ingestion of a caustic substance
 - allergic / anaphylactic reaction
 - respiratory burns

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- meet the requirements of Policy #5600, Withholding Resuscitation Efforts
 - have appropriate DNR paperwork or medallion (reference Policy #5620, Do Not Resuscitate)
8. MLAs should not be forced. If resistance is met on intubation attempts, the tube should be removed and BVM continued.
 9. MLAs must be stored in their original boxes to ensure maintenance of proper curvature (important for placement and function).

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NASOPHARYNGEAL AIRWAY INSERTION

1. This procedure should be used on a patient who is not able to maintain a patent airway yet has adequate respiratory effort. This airway adjunct device is generally well tolerated and not as likely to stimulate vomiting.
2. Contraindications include:
 - Nasal bleeding.
 - Suspected or confirmed basilar skull fracture.
 - Mid-facial trauma.
3. Complications include:
 - If the tube is too long, it may enter the esophagus, causing gastric distention.
 - May cause bleeding of the nasal mucosa and possible aspiration of blood.
4. Insertion Procedure:
 - 4.1 The correct size airway must be selected in order to minimize trauma to the nostrils. It is important to maintain head-tilt with anterior displacement of the mandible by chin-lift and, if necessary, jaw thrust when using this airway.
 - 4.2 The nasopharyngeal airway should be well coated with a water soluble lubricant before insertion.
 - 4.3 Insert the airway straight back through the nose with the beveled edge of the airway toward the septum. If resistance is encountered, slight rotation of the tube may help pass the tube into the nasal passage and the nasopharynx.
 - 4.4 The nasopharyngeal airway is positioned in one nostril, with its curvature following the curve of the floor of the nose.
 - 4.5 If an obstruction is met as the airway is introduced, the airway should be removed and inserted into the other nostril.
 - 4.6 Immediately after insertion of the nasopharyngeal airway, check the ventilation status. If ventilations are absent or inadequate, artificial ventilation should be initiated with a bag-valve-mask device.
 - 4.7 The use of a nasopharyngeal airway shall be documented in writing on the Prehospital Care Report (PCR) and should be reported via radio to the emergency department at the receiving hospital.

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NASOTRACHEAL INTUBATION

1. The purpose of this policy is to define the indications, contraindications and procedure for the utilization of nasotracheal intubation of the adult patient.
2. The following conditions may be indicators for nasotracheal intubation:
 - Impending respiratory failure or hypoventilation when respiratory distress is refractory to high flow oxygen therapy and medications.
 - Possible cervical spine injury.
 - Clenched jaw.
 - Visual laryngoscopy unavailable due to patient trapped and inaccessible.
 - Gag reflex still present.

NOTE: If the patient can be adequately ventilated utilizing the bag-valve-mask, then nasotracheal intubation may **not** be necessary.

3. The following conditions are contraindications to nasotracheal intubation:
 - Apnea;
 - Head, facial or nasal trauma with possible basilar skull fracture;
 - Blood or fluid draining from the ears or nose;
 - Facial fractures;
 - Battle's Sign or Raccoons Eyes;
 - Children less than 50 kg or 15 years of age;
 - Anticoagulant therapy or hemostatic disorder;
 - Laryngeal fracture;
 - Suspected altered level of consciousness from hypoglycemia or overdose of narcotics prior to the administration of Narcan and/or dextrose.
4. Complications from this procedure include:
 - Epistaxis
 - Esophageal or right mainstem intubation
 - Vomiting
 - Nasal septum and turbinate trauma
 - Increased intracranial pressure from increased vagal stimuli
5. The following procedure should be done:
 - 5.1 If no cervical spine injury is suspected, position the patient in "sniffing" position. Have in-line axial stabilization maintained if cervical spine injury is suspected.
 - 5.2 Explain the procedure, if the patient is conscious.
 - 5.3 Spray phenylephrine HCl (Neo-Synephrine) into both nares.
 - 5.4 Hyperventilate the patient with 100% oxygen for several minutes prior to the nasotracheal intubation attempt.
 - 5.5 Inspect and select the nostril that appears to have the best airflow.

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- 5.6 Select the proper endotracheal tube that will fit into the nostril and lubricate the distal tip with 2% viscous lidocaine or water soluble lubricant.
 - 5.7 Apply cricoid pressure with one hand, insert and guide the endotracheal tube along the curve of nasopharynx with the other hand. If resistance is encountered, don't force the tube in; withdraw the tube, hyperventilate and attempt in the other nostril.
 - 5.8 Make only one attempt per nostril. No attempt should last longer than one (1) minute in duration.
 - 5.9 Advance the tube until maximum airflow is heard.
 - 5.10 Check tube placement by assessing symmetry and expansion of chest when ventilating. Auscultate for bilateral, equal breath sounds and for absence of gastric sounds.
 - 5.11 Inflate the cuff with minimal occluding volume of air and ventilate the patient with a bag-valve device with 100% oxygen. **Attach an End-Tidal CO₂ monitoring device.**
 - 5.12 Secure the tube with tape or other device.
 - 5.13 Reassess tube placement, lung sounds and ET CO₂ monitor frequently.
 - 5.14 Transtracheal instillation of medications may be administered as per Advanced Cardiac Life Support (ACLS) algorithms and EMS Agency protocols.
6. The EMT-P shall document the procedure on the procedure evaluation form and submit it to the ALS Provider QI Department. This form, with a copy of the PCR attached, shall be submitted to the EMS Agency.

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Date: 4/1/05

NEEDLE CRICOTHYROTOMY

1. Needle cricothyrotomy is an invasive airway procedure of last resort. A base hospital order is not necessary for this procedure. However, careful and complete patient assessment is necessary. It is to be used only on those patients who meet ALL of the following criteria:
 - are unconscious and unresponsive
 - are greater than 8 years old
 - have a complete upper airway obstruction - - no movement of air is possible
2. Immediate transport to the closest facility is the primary treatment for persons with complete airway obstruction. In no way should transport be delayed to attempt airway maneuvers or needle cricothyrotomy.
3. Causes of complete airway obstruction include (but are not limited to):
 - 3.1 Foreign body aspiration

In such cases, ensure at least 2 full cycles of BLS obstructed airway (FBAO) procedures have been performed (refer to policy #6830, Airway Obstruction) prior to consideration of cricothyrotomy. Continue with FBAO measures while preparing for cricothyrotomy. Visualization of the airway to determine appropriateness of Magill forceps use must be done just prior to beginning the cricothyrotomy procedure.
 - 3.2 Isolated trauma to the neck and/or face

Which makes placement of an ETT or MLA impossible (due to deformity) or where obvious signs of subcutaneous air in the neck region are present. Inability to visualize the vocal cords for ETT placement due to excessive blood and/or vomitus is NOT a reason to perform needle cricothyrotomy. In these instances an MLA should be placed.
 - 3.3 Edema due to anaphylactic / inflammatory response

Attempts at ETT insertion with a small diameter tube should be made prior to attempting cricothyrotomy.
 - 3.4 Tumor

This will be a truly rare circumstance, and attempts at small diameter ETT placement should be made first.
4. The following conditions are contraindications to needle cricothyrotomy:
 - inability to identify anatomical landmarks
 - underlying anatomical abnormalities
 - ventilation by any other means
 - valid prehospital DNR - refer to Policy #5620, Do Not Resuscitate.

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5. An approved needle cricothyrotomy device must include a curved catheter-over-needle, no larger than 10 gauge, with an attached adaptor for bag-valve-mask and for a syringe, with a collar to which tracheostomy ties may be attached.
6. Placement procedure:
 - 6.1 If no cervical spine injury is suspected, place patient in a “sniffing” position. If cervical injury is suspected, maintain axial stabilization.
 - 6.2 Open kit and prepare equipment by opening antiseptic wipe (not included in kit) and attaching catheter to syringe.
 - 6.3 Identify and palpate the cricothyroid membrane. With your non-dominant hand, place a finger on the Adam’s apple (thyroid cartilage) and slide it down approximately 3 cm (1 - 1 1/4 inches).
 - 6.4 Stabilize the area with your thumb and forefinger.
 - 6.5 Prep the area with an appropriate cleansing agent.
 - 6.6 Insert catheter/needle (with syringe attached) through the cricothyroid membrane directed towards the sternum at an approximate 45° angle.
 - 6.7 While advancing the needle and catheter aspirate the syringe to confirm placement by free air return.
 - 6.8 Once airway placement is confirmed, remove syringe and needle, leaving the catheter in place.
 - 6.9 Fix the airway catheter into place with the tie tape.
 - 6.10 Connect to an appropriate oxygen source (BVM).
7. In addition to documentation on the PCR of the procedure and the patient’s response to it, the EMT-P shall complete and submit a Procedure Evaluation form as per agency policy.

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NEEDLE THORACOSTOMY

1. Needle thoracostomy is to be used for temporary decompression of the patient with a tension pneumothorax.
2. Needle thoracostomy can be performed prior to contact on both adult and pediatric trauma patients.
3. Needle thoracostomy may be considered on victims of blunt or penetrating chest trauma who have the following signs/symptoms:
 - Asymmetric breath sounds - absent on the affected side(s).
 - Unstable vital signs
 - Respiratory distress and failing respirations
 - Hypoperfusion - confusion, diaphoresis, tachycardia
4. The following procedure should be done:
 - 4.1 With the patient supine, prep the skin over the upper anterior chest of the affected side should be prepped in aseptic fashion.
 - 4.2 Using aseptic technique, identify the second intercostal space on the affected side.
 - 4.3 At the mid-clavicular line, a 14 gauge IV catheter (minimum of two (2) inches long) should be passed over the superior edge of the third rib. The IV catheter should be inserted at a 90E angle. The IV catheter should be advanced approximately 1 - 12 inches. Upon advancing the catheter, note whether there is a rush of air.
 - 4.4 The needle inside the catheter should be withdrawn, leaving the IV catheter in place.
 - 4.5 A gauze sponge may be gently rested over the catheter to prevent "aerosolizing" of blood from the catheter. The gauze sponge shall not occlude the free movement of air through the catheter.
 - 4.6 Reassess breath sounds and document on the Prehospital Care Report (PCR).
 - 4.7 The EMT-P shall document the procedure on the procedure evaluation form and submit it to the ALS Provider QA Department. This form, with a copy of the PCR attached, shall be submitted to the EMS Agency.

PEDIATRIC INTUBATION

1. Pediatric intubation is an Advanced Life Support procedure to be used on the apneic patient. Like all Advanced Life Support procedures, good Basic Life Support must be done prior to any attempts. The procedure is similar to adult intubation, but due to the difference in anatomy between the adult and pediatric patients, there are some significant differences in the performance of the procedure. (see #4 below)
2. Indications include:
 - 2.1 Cardiac arrest.
 - 2.2 Near drowning that results in apnea and/or cardiac arrest.
 - 2.3 Non-responsive, apneic patients that are unable to be adequately ventilated with bag-valve mask device.
 - 2.4 The airway cannot be controlled and the patient cannot be ventilated with bag-valve mask device.
 - 2.5 Intubation for tracheal suction in cases of meconium aspiration.
3. Contraindications include:
 - 3.1 The apneic patient who can be adequately ventilated with bag-valve mask device.
 - 3.2 Patients with obvious cervical spine injury.
4. Pediatric Airway Anatomy:
 - 4.1 The structures are proportionately smaller and more flexible than an adult.
 - 4.2 The tongue is larger in relation to the oropharynx.
 - 4.2 The epiglottis is narrow and “floppy”.
 - 4.3 The glottic opening is higher and more anterior in the neck.
 - 4.4 The epiglottis is U-shaped and extends into the pharynx.
 - 4.5 The vocal cords slant upward, toward the back of the head and they are closer to the base of the tongue.
 - 4.6 The vocal cords are short and concave.
 - 4.7 The larynx is slightly higher in the neck.
 - 4.8 In children less than eight (8) years old, the narrowest part of the upper airway is in the cricoid cartilage, not the glottic opening.
 - 4.9 In the newborn, the trachea is 4 cm. long.

These anatomic differences have the following important practical consequences:

- It is difficult to create a single, clear, visual plane from the mouth through the pharynx to the glottis for intubation.
- Endotracheal tube size is crucial and must be selected based on the size of the cricoid ring rather than the glottic opening.

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5. Infants and small children are believed to have greater vagal tone. In the pediatric patient who is apneic but still has a pulse, endotracheal intubation may cause a vaso-vagal response. This may dramatically slow the child's heart rate and decrease cardiac output and blood pressure. The heart rate must be monitored throughout the procedure to guard against this complication. If the heart rate falls < 60 beats/minute for a child or 80 beats/minute for an infant, the procedure should be stopped and ventilations (with 100% oxygen) should be delivered.
6. The small child is particularly prone to tracheal cuff injury and trauma due to the passage of the tube through the cricoid cartilage. Children younger than 6 years old should be intubated with an uncuffed endotracheal tube.
7. Consider head immobilization to prevent airway dislodgement.
8. Because of a newborn's extremely short (4 cm) trachea, the risk of mainstem bronchus intubation is much higher than in the adult or older child.
9. With no rise and fall of the chest and with auscultating air in the gastric area, esophageal intubation has most likely occurred. If this happens, pull the tube immediately and hyperventilate with a bag valve mask.
10. Although either a straight or curved blade may be used, it is recommended that a straight blade be used with infants. It is advisable to use the straight blade to directly lift the epiglottis, rather than inserting the curved blade into the valleculae. It may prove beneficial to insert the blade well into the esophagus, then withdraw slowly until the glottic aperture is visualized.
11. The procedure for transtracheal instillation of medications is the same as for an adult patient. Medication options are atropine, epinephrine, lidocaine and narcan. Hyperventilate before and after administration. Tube placement is crucial and with the smaller pediatric airways, even the slightest movement can be critical. Constant reassessment and extra caution to stabilize the tube during medication administration are important.
12. The EMT-P shall document the procedure on the procedure evaluation form and submit it to the ALS Provider QA Department. This form, with a copy of the PCR attached, shall be submitted to the EMS Agency.

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TRANSCUTANEOUS PACING (TCP)

1. This procedure should be used on adult patients experiencing
 - hemodynamically unstable bradycardia
 - hemodynamically unstable AV blocks with wide complexes

Consider alternative causes of the dysrhythmia and treat appropriately prior to initiation of TCP

 - hypoxia
 - trauma
 - drug overdose
 - electrolyte imbalance
2. Do not use TCP
 - on children ≤ 12 years old (bradydysrhythmias in children are usually respiratory related)
 - on any patient in asystole
 - bradysystolic arrest, unless approved by base hospital
3. TCP should be initiated after treatment with atropine (2 doses) has failed to return and maintain a hemodynamically stable rhythm.
4. If there is difficulty / delay in establishing an IV for atropine dosage, proceed to pacing while IV is being established. Pacing may be continued simultaneously with atropine dosing once the IV is established.
5. Set initial TCP rate at 70 ppm **after** pads are placed on patient. Begin output at 20 milliamps (mA). Increase by 20 mA until capture / pulses are noted, then decrease by 5 mA until pulses / capture are lost. Increase by 5 mA until recapture / return of pulses.
6. If capture is maintained but the patient remains symptomatic of inadequate tissue perfusion (low BP, altered LOC), consider increasing the rate by 10 ppm until 100 ppm is reached. If perfusion remains a problem, consider pump and/or volume disturbances and contact the base hospital.

APPENDIX

Policy: 70

Date: 06/1/08

TRANSTRACHEAL INSTILLATION OF MEDICATION

1. The purpose of this policy is to define the indications and procedure for the transtracheal instillation of medications.
2. In a cardiac arrest or other medical situation, it is not always possible to administer essential drugs intravenously. It has been shown that some of these drugs are readily absorbed into the circulatory system via the tracheobronchial tree. If endotracheal (ET) intubation is successful, it is possible to give some specific drugs down the ET tube when no IV access has been established. (There are additional alternative routes if an IV cannot be established. All drugs listed below can be administered IO; narcan can also be given IN. The transtracheal route should be the route of last resort.) The dosages of medications administered via the ET are generally doubled except for pediatric epinephrine.
3. The following drugs and dilutions are recommended to achieve ET dosages:
 - 3.1 Adult
 - Atropine 2.0 mg, diluted to a total of 10cc with sterile water or normal saline
 - Epinephrine 2.0 mg (1:1,000), diluted to a total of 10cc with sterile water or saline
 - Narcan 0.8 - 4.0 mg, diluted to a total of 10cc with sterile water or normal saline
 - Lidocaine 3.0 mg/kg**With multiple dosings, no more than a combined total of 30 cc of fluid should be administered transtracheally without Base Hospital consultation.
 - 3.2 Pediatric - individual doses should be diluted with NS to a 1 - 3cc fluid volume:
 - Atropine 0.02 mg/kg (min dose is 0.1mg)
 - Epinephrine 0.1 mg/kg (1:1000)
 - Narcan 0.2 mg/kg
 - Lidocaine 2.0 mg/kg**With multiple dosings, no more than a combined total of 15 cc of fluid should be administered transtracheally without Base Hospital consultation.
4. The following procedure should be done:
 - 4.1 Confirm medication dose (drug, amount, dilution and route of administration)
 - 4.2 Reassess the placement status of the endotracheal tube prior to the medication instillation.
 - 4.3 Maintain CPR, if indicated.
 - 4.4 Hyperventilate the patient 4-6 times.
 - 4.5 Remove the bag-valve-mask from the adaptor of the endotracheal tube.
 - 4.6 Remove the needle from the syringe, if needle is not permanently attached.
 - 4.7 Instill the prescribed medications.
 - 4.8 Reattach the bag-valve mask to the adaptor and hyperventilate the patient 4-6 times to aid in the dispersion of the medication.
 - 4.9 Re-evaluate the patient's status and EKG rhythm.
5. Precautions include:
 - Ventilations should not be interrupted for more than five (5) seconds.
 - Care should be exercised not to move the tube.
 - Reassess the tube placement after each instillation.
 - Continue CPR as indicated.

APPENDIX

Policy: 80

Date: 7/1/06

12-LEAD EKG

1. A 12-lead EKG will be considered on patients with the following presentations:
 - Chest, jaw, or shoulder pain/discomfort
 - Dysrhythmia
 - Shortness of breath / dyspnea
 - General weakness
 - Syncope or near-syncope
 - Epigastric discomfort
 - Diaphoresis inconsistent with environment
 - Diabetic patients with unusual complaints
 - Patients with a history of CHF, coronary artery disease, or cardiac transplant
 - Any patient the paramedic feels would benefit from a 12L assessment
2. The 12-lead EKG should be performed as part of a complete patient assessment but should not delay immediate treatment needs. If not detrimental to the patient's condition, the initial 12-lead should be performed prior to medication administration.
3. If, upon review of the tracing, you note abnormalities / injury / ischemia patterns consistent with MI, prepare patient for immediate transport.
 - 3.1 Notify the receiving hospital.
 - 3.2 During transport:
 - 3.2.1 Start a (2nd) IV line - - dual lumen preferred.
 - 3.2.2 Draw and label blood samples from IV start to include purple top, small blue top, red top or tigertop, and green top, if available
 - 3.2.3 Complete thrombolytic checklist, Policy #7210, Chest Pain Assessment.
 - 3.2.4 Upon arrival at the ED, a second EKG should be obtained.
4. Base hospital consult must be attempted when any ONE or more of the following is present:
 - A patient without chest discomfort produces a 12L with ST elevation >1 mm in 2 or more contiguous leads (silent MI)
 - A patient presents with s/s of acute MI, hypotension, and clear lung sounds. These patients may be experiencing an RVI --- MS and NTG can be detrimental to their care. A fluid bolus may be the treatment of choice.
5. Upon arrival at ED, photocopy or reprint EKG tracing(s). Attach original(s) to hospital PCR; attach copy(s) or 2nd print(s) to your PCR.