Intubation Procedure

The purpose of insertion of an endotracheal tube via the oropharynx to the trachea is to establish and maintain a patent airway in the event of acute respiratory failure caused by:

1. Apnea
2. Upper airway obstruction (i.e. aspiration of foreign body croup, supraglottic/glottic/subglottic lesions)
3. Lower airway obstruction/infection (i.e. severe asthma, bronchiolitis, pneumonia)
4. Inadequate chest wall function (i.e. Guillain-Barre, flail chest, muscular dystrophy)
5. Neurological deficit resulting in inadequate protection of airway (i.e. seizures, unconsciousness)
6. Control of ventilation not related to respiratory failure (i.e. intracranial pressure control)

The ALS RN or ALS RT will immediately notify the PICU attending physician:

1. In an emergency, as soon as possible, while advanced life support is being initiated
2. If any complications result in performance of the procedure including: Severe hypoxia unrelieved by intubation
3. Any evidence of excessive bleeding in the mouth or endotracheal tube, loss of teeth, or other signs of trauma
4. Three unsuccessful attempts at intubation, with deterioration in patient condition
5. Regurgitation of stomach contents
6. Upon successful ETT placement
7. Prior to departure from referring facility with patient status information

Equipment

1. ECG/02 Sat monitor in place with alarms on.
2. Laryngoscope with appropriate blade size:
   a. Age 0 (newborn): blade 0 or 1
   b. 1 month – 1 year: blade 1 or 2
   c. 1 year – 15: blade 2 or 3
   d. > 15 years: blade 3
3. Sterile endotracheal tube with stylette size appropriate to the child. Also endotracheal tubes 1/2 size larger, and 1/2 size smaller.
   a. Size = (age in years + 16)/4
   b. Size = (age in years/4) + 4
4. IV
5. Appropriate size anesthesia bag and mask with 100% Oxygen
6. Adhesive tape and Fastrac (pre-cut appropriate size)
7. Stethoscope
8. Rigid suction
9. Mastisol
10. Needle Holder
11. 3.0 prolene suture with tapered needle
12. Medications and NS flushes

Procedure
1. Set up CPAP bag to high flow O2 (100%) with peep valve adjusted
2. Turn on wall suction to 80-100mm of Hg. and attach tubing to a Yankauer suction
   a. Suction will be needed to clear oral secretions.
3. Connect patient to a cardiac monitor and pulse oximeter
4. Position patient for maximal visualization and easy access. The patient should be on a flat surface with the head in a midline sniffing position.
   a. Maintain in a supine position, making sure the patient’s neck is not hyperextended. Hyperextension of the head can obstruct the airway, because of relatively soft, pliable trachea, thus making the cords more difficult to visualize. A small pillow under the head will align the oral pharynx and the vocal cords.
5. Pre-oxygenate for 3 minutes with 100% O2 with tight fitting mask, or 5 deep crying breaths.
   a. Decreases incidence of hypoxia and bradycardia
6. Check to be sure that a functioning secure IV is in place. If IV is not functional, obtain IV equipment and proceed to next step. Do not start IV at this point.
   a. Should deterioration of patient occur while IV is being started, all equipment, meds and flushes will be ready and accessible.
7. Obtain recommended size ETT. Include 1/2 size above and below the calculated size.
   a. Newborn: 3.0 – 3.5 uncuffed
   b. 6 months: 3.5 – 4.0 uncuffed
   c. 1 year: 4.0 – 4.5 uncuffed
   d. 2 years: 4.5 uncuffed
   e. 4 years: 5.0 uncuffed
   f. 6 years: 5.5 uncuffed
   g. 8 years: 6.0 cuffed
   h. 10 years: 6.5 cuffed
   i. 12 years+: 7.0 cuffed
8. Insert a stylette in the tube to make the tube more rigid. Place in sterile package and set aside until ready for use.
   a. Stylette should not penetrate out of tip of the endotracheal tube. This can cause perforation when inserting into trachea. Keep stylette 1cm from distal end of ETT tube. It should be secure in the adapter so that it will not advance further during intubation.
9. Check laryngoscope blade light.
a. Light must be bright. If dim, batteries and/or bulb should be changed

10. Ensure appropriate size Laryngoscope blade
   a. A larger blade will ensure reaching the epiglottis. In older children visualization may be enhanced with a curved blade.

11. Cut strip of fastrac to fit above child's upper lip. Cut out small area in middle of strip to accommodate nose. Cut 3 pieces of regular tape (1 inch tape) One piece long enough to cover fastrac. Two pieces each split. Open package of 3-0 suture and grasp with needle holder.
   a. Strip should be cut large enough to extend about 2 cm on either side of corners of mouth. Split pieces are used to wrap around the endotracheal tube. Long piece is used to secure fastrac to face. Suture will be used to secure ETT to fastrac

12. Draw up medication in labeled syringes
   a. See step 14 for medications

13. Start new IV if needed.

14. Pre-medication
   a. Atropine for < 6 months of age 0.02 mg/kg
      i. Minimum dose: 0.1 mg
      ii. Give medications in an IV port as close to the patient as possible so that they are immediately washed into the vascular system. Flush between each medication.

15. Sedation
   a. Ketamine 1 mg/kg
      i. May be used for status asthmaticus
   b. Sodium Pentothal 5 mg/kg
      i. For patients who are hypertensive, actively seizing and/or with suspected increased intracranial pressure and who are hemodynamically stable
   c. Fentanyl 1 – 2 mcg/kg
      i. For patients who are normotensive or patients with borderline hypotension
   d. For hemodynamically unstable patients: No sedation will be used until ETT is secure and case is discussed with ICU attending

16. Muscle Relaxant
   a. Succinylcholine
      i. 2 mg/kg < 6 months
      ii. 1 mg/kg > 6 months
      iii. Always give with Atropine
      iv. Don’t use on patients with: Burns, Crush injuries, Serum K+ > 4.5, Neuro-muscular disease
   b. Vecuronium 0.3 mg/kg
   c. Full muscle relaxation should occur within to 30 to 45 seconds. Wait one full minute for optimal intubation conditions. Preferable no ventilation is performed during this
time in order to prevent gastric distention, thereby increasing the possibility of regurgitation. If mask ventilation is required, only low volume or pressure ("panting") breaths will be administered at pressures less than 20 cm H20.

17. Apply cricoid pressure as medications are given and continue to apply until proper tube placement is confirmed.
   a. Occludes esophagus thereby, preventing regurgitation (and possible aspiration)

18. After 45 seconds to one minute assess for adequate relaxation by opening the jaw and assessing resistance.
   a. Jaw relaxation indicated that the vocal cords are paralyzed and that it is time to proceed with intubation.

19. Advance tip of blade so it comes to rest on the vallecula.
   a. The vallecula is a wedge-like space situated between the epiglottis and base of the tongue.

20. Suction secretions if obscuring vision

21. Lift the blade slightly upward to expose the opening of the trachea. Identify landmarks If blade is in the esophagus withdraw slowly so glottis and epiglottis will fall into view. If blade is not in far enough, advance slowly in the vallecula.
   a. Lifting the blade upward exposes the glottis. When lifting the blade, raise the entire blade by pulling up in the direction the handle is pointing. Do not let handle and blade rock back onto teeth.
   b. Anatomy looking into mouth:
      i. Trachea is anterior to the esophagus
      ii. Esophagus is round or oval and the trachea is an A-P slit-like opening
      iii. The epiglottis appears as a pink, arched rim, which often tapers to a rounded point.

22. With the glottis and cords exposed, take ETT in right hand and insert gently into trachea. Pass the endotracheal tube through the right corner of the mouth lateral to the laryngoscope blade so that the view of the vocal cords is not obscured. If the person intubating is unable to insert the tube in 20 seconds, remove the laryngoscope and ventilate the patient with bag and mask until the patient is stabilized, then begin procedure again.
   a. Listen to and/or watch the cardiac monitor for bradycardia due to vagal stimulation. Bradycardia may make it necessary to stop the procedure and re-stabilize the patient with bag and mask ventilation before beginning again.
   b. If possible assistant may pull down right corner of mouth. The groove in the laryngoscope blade is for visualization, not a guide for the ET tube to follow.

23. Do not insert ETT too deeply into the trachea. Advance only about 2 cm past glottis in the infant and up to 5 cm in the older child. The
black vocal cord guide should align at the level of or just past the cords. Do not insert ETT too deeply into the trachea. Advance only about 2 cm past glottis in the infant and up to 5 cm in the older child. The black vocal cord guide should align at the level of or just past the cords.

a. The ETT cm marking at the teeth should be: age (Yrs) + 10 cm.

24. With the right hand held against the face, hold the tube firmly at the lips. Use left hand to carefully remove the laryngoscope without displacing the tube. Remove stylette.

25. Listen with stethoscope to determine placement of the tube

a. Breath sounds should be equal bilaterally. The breath sounds should be louder over the chest than over the stomach. The chest should rise equally bilaterally with each ventilation. Observe a slight rise of the chest with each ventilation and no abdominal distension. Vapor should be noted in ETT. It may be necessary to move the ETT in or out slightly (1 cm maximum) while auscultating the chest to be sure that both lungs are being ventilated adequately. Keep patient's head in midline position to prevent dislodging tube until the tube can be fixed securely.

26. Once proper ventilation has been established, ventilate patient with anesthesia bag at appropriate rate and pressure.

a. X-rays help to confirm placement of the ETT. This may be deferred until arrival at CHHC.

27. Secure Tube

Documentation

1. Document on transport notes, time of intubation, reason for intubation, size of tube, tolerance of procedure, number of attempts, any trauma and where the tube is sutured (cm marker).