
Emergency Medical Services Agency



Paramedic Intubation Module

March 2001



CONTRA COSTA COUNTY EMERGENCY MEDICAL SERVICES

INTUBATION SKILLS REFRESHER MODULE

Purpose:

To enable the EMT-P to practice and demonstrate advanced airway skills. This course is required annually for continuous County Accreditation. Successful completion of ACLS recertification shall be considered as equivalent to this course once in a two year cycle.

Instructional Objectives:

At the conclusion of this course, the student shall be able to:

- Identify indications for endotracheal intubation according to County protocol
- Identify important anatomical structures related to the intubation of a patient
- Identify anatomical differences between adults and children
- Refresh working knowledge of intubation equipment and airway support adjuncts
- Review complications of intubation
- Review techniques for confirmation of tube placement and ongoing monitoring
- Successfully demonstrate adult and pediatric intubation procedures, including in-line intubation of patients with c-spine immobilization.

Course Content:

- I. Video Tape: Intubation Refresher Module – Dr. Joseph Barger
Video Tape: Airway-Cam Volume One
- II. Skills Testing (each station should be demonstrated prior to testing.)
 - A. Stations:
 - 1) Station 1 - Adult Intubation
 - 2) Station 2 - Pediatric Intubation
 - 3) Station 3 - In-line c-spine immobilization
 - B. Skills Refresher Completion Criteria
 - 1) EMT-P's must correctly perform, in the proper sequence, all performance steps in each of the three (3) stations.
 - 2) The endotracheal tube must be in the trachea when checked by the evaluator.
 - 3) If an esophageal intubation occurs, or the EMT-P is unable to correctly intubate, the station may be repeated once. If the EMT-P is unable to correctly intubate a second time, the physician course director must observe and sign off the station on the attached form.
 - 4) If an evaluator has any question regarding the technique used by the EMT-P, the physician course director must observe the technique.
 - 5) It is the responsibility of the physician course director, or his/her designee, to ensure that all participants have successfully completed each station according to the standard.

Course Approval:

This skills refresher module is approved for two (2) hours of Category I ALS CE by the EMS CE provider sponsoring the course.

Endotracheal Intubation – excerpted from Prehospital Care Manual

In adults, oral endotracheal intubation is the optimal method of advanced airway control. Intubation allows for protection of the airway and decreases the chance of aspiration.

In pediatric patients, BLS maneuvers are the preferred method for initial airway management and are frequently sufficient to maintain the airway. If BLS maneuvers appear ineffective or are unable to be maintained, intubation should be considered. Gastric distention is common with use of BLS maneuvers, but aspiration frequency is similar in intubated and non-intubated patients. The elder (demand) valve is not to be used when ventilating pediatric patients. Because training and experience with pediatric intubation is variable, only paramedics who have completed the Contra Costa County advanced airway certification requirements may perform this skill.

Nasotracheal intubation is not an approved skill in Contra Costa County.

Base hospital physician consultation is recommended if there is any question concerning the need to intubate a patient. The Base Hospital physician may also approve extubation of a patient in the field (aside from extubation for meconium aspiration of newborns).

» Indications

- Patient in cardiopulmonary or respiratory arrest
- Patient with severe respiratory distress (adults)
- Patient with a respiratory rate of 6 or less, or with ineffective respiratory effort

» Contraindications

- Isolated medical respiratory arrest with suspected hypoglycemia or narcotic overdose
- Maxillo-facial trauma with unrecognizable facial landmarks
- Patients experiencing seizures
- Patients with an active gag reflex

» Equipment

- | | |
|-----------------------------------|--|
| ✓ OPA: sizes 000-6 | ✓ Extra Batteries |
| ✓ Water Soluble Lubricant | ✓ Suction |
| ✓ 12 cc Syringe | ✓ Extra Bulbs |
| ✓ Laryngoscope handle | ✓ Stethoscope |
| ✓ Magill Forceps (pedi/adult) | ✓ 1" Waterproof Tape/Tube Holder |
| ✓ Stylets (pedi/adult) | ✓ Bag-Valve-Mask |
| ✓ Laryngoscope blades: 2 each | ✓ Esophageal intubation detection bulb |
| ○ #2, 3, 4 MacIntosh blade | ✓ End-tidal CO2 detector |
| ○ #0, 1, 2, 3, 4 Miller blade | |
| ✓ ET Tubes: 3 each, sizes 2.5-9.0 | |

- ✓ Towels

Procedure

1. Assure an adequate BLS airway.
2. Hyperventilate with 100% oxygen using a bag-valve-mask or demand valve.
3. Select appropriate ET tube. If appropriate tube has a cuff, check cuff to ensure that it does not leak; note the amount of air needed to inflate. Deflate tube cuff. Leave syringe attached.
 - a. Insert appropriate stylet, making sure that it is recessed at least one cm. from the distal opening of the ET tube. Lubricate the tip of the tube.
4. Assure c-spine immobilization with suspected trauma.
5. Insert laryngoscope and visualize the vocal cords.
6. Suction if necessary and remove any loose or obstructing foreign bodies.
7. CAREFULLY pass the endotracheal tube tip past the vocal cords; remove the stylet; advance the ET tube until the cuff is just beyond the vocal cords; then inflate the cuff with 5-7cc of air. In uncuffed pediatric tubes, advance tube no more than 2.5 cm beyond vocal cords (use vocal cord marker line if present on tube);
 - a. Attach the compressed esophageal intubation detector bulb to the end of the ET tube and release the bulb. If the bulb does not fully re-inflate, extubate the patient and repeat steps 2 through 7.
 - b. If the patient is not in cardiac arrest, attach end-tidal CO₂ detection device to the ET tube. Observe for presence or absence of color change in device after several ventilations. If there is no color change, extubate and repeat steps 2 - 7.
 - c. Auscultate the chest for air entry on the right and left sides equally. Look for symmetric chest wall rise.
- 8. If the chest DOES NOT RISE, extubate and repeat steps 2 - 7.**
9. Auscultate the left upper quadrant of the abdomen. If air entry heard, extubate, repeat steps 2 - 7.
10. Secure the tube with tape or ET holder and ventilate. Mark the TUBE at the level of the lips.
11. Re-auscultate the lung fields and the left upper quadrant to assure correct placement of the tube.
12. Continue to monitor the patient for proper tube placement throughout prehospital treatment and transport. ET tube placement is to be reassessed with the esophageal intubation detector bulb after any patient movement.
13. Document time of intubation, landmarks used to verify tube placement, and times and results of tube placement checks performed throughout the resuscitation and transport.

STOMAL INTUBATION

For patients with existing tracheostomy without tube (mature stoma):

1. Assure an adequate BLS airway.
2. Hyperventilate with 100% oxygen using a bag-valve-mask. Do not use demand valve.
3. Select the largest endotracheal tube that will fit through the stoma without force (it should not be necessary to lubricate the tube).
4. Check cuff, if applicable.
5. Do not use a stylet.
6. Pass endotracheal tube until the cuff is just past the stoma. Right mainstem bronchus intubation may occur if the tube is placed further since the distance from tracheostomy to carina is less than 10 cm. The tube will protrude from the neck by several inches.
7. Inflate the cuff
8. If the patient is not in cardiac arrest, attach end-tidal CO₂ detection device to the ET tube. Observe for presence or absence of color change in device after several ventilations. If there is no color change, extubate and repeat steps 2-7.
9. Auscultate the chest for air entry on the right and left sides equally. Look for symmetric chest wall rise. Check neck for subcutaneous emphysema, which indicates false passage of tube. If the chest DOES NOT RISE, extubate and repeat steps 2-7.
10. Secure the tube with tape and ventilate.

Note: Do not attempt to reinsert a dislodged pre-existing tracheostomy tube

Notes on Advanced Airway Management – excerpted from Prehospital Care Manual

► ENDOTRACHEAL MEDICATIONS

The following medications may be administered via the endotracheal tube:

- Lidocaine
- Epinephrine
- Atropine
- Narcan (Naloxone)

In general, endotracheal doses should be doubled from the usual intravenous dosage. In pediatric patients (other than neonates), endotracheal doses of epinephrine are increased by ten-fold by usage of 1:1000 preparation for endotracheal administration.

In adult patients, there is no limit to the number of doses or total volume of fluid which may be administered. Medications should be diluted to a volume of 10 ml prior to administration.

A maximum of 3 doses of medication may be instilled in pediatric patients (base physician may order additional doses). Medications in pediatric patients should be diluted to a volume of 3 - 5 ml prior to administration through the ETT. Several ventilations should be provided using BVM after medication administration.

► ESOPHAGEAL OBTURATOR AIRWAY

The EOA is a secondary option to endotracheal intubation in providing a method of ventilating patients who are unconscious, apneic and pulseless.

The EOA should not be used if:

- The patient is less than 16 years of age, or less than 5 feet in height
- The patient is responsive, or has a positive gag or blink reflex
- The patient has suspected esophageal disease or trauma
- The patient has ingested caustics
- The patient has a patent tracheostomy
- The patient's unresponsiveness is considered to be secondary to hypoglycemia or narcotic overdose (Dextrose and/or Narcan should be given prior to using the EOA)

Use the tongue-jaw lift, and neck flexion to put in the EOA, except in patients with suspected C-spine injuries. Never use force during the insertion of the tube.

Most patients should be intubated prior to deflating and removing the EOA. If the patient's condition improves en route and s/he cannot tolerate the EOA, be sure to deflate the balloon and anticipate immediate regurgitation upon extubation. Confirm that receiving hospital personnel understand how to use and how to remove the EOA. **EGTA's are not used in Contra Costa County.**

► END-TIDAL CO₂ (ETCO₂) DETECTION DEVICES

All intubated patients who are not in cardiac arrest require additional confirmation of tube placement by use of an ETCO₂ device. After intubation and confirmation of tube placement via esophageal detection

device (bulb), patients should have an ETCO₂ device placed (either in-line or using integrated device in bag-valve-mask).

Use of an ETCO₂ device in a pulseless patient is unreliable in assessing tube placement. Color change may or may not be present on initial intubation, and change in ETCO₂ detection later may not be indicative of tube dislodgment. Use of other methods of detection (bulb initially, physical exam or direct laryngoscopic visualization) are needed in these patients.

Colorimetric devices will change color when carbon dioxide is detected. If no color change occurs after several ventilations in intubated patients with pulses, incorrect tube placement has likely occurred. The tube must be removed and intubation may be reattempted if indicated.

Continuous observation of the colorimetric device is essential. If correct intubation occurs initially with appropriate color change, and later the device indicates no ETCO₂ detected, the patient should be immediately reassessed. If the patient is confirmed to have a pulse, the tube has likely dislodged. The tube must be removed and intubation may be reattempted if indicated.

If the device becomes contaminated with fluids or emesis, it is no longer reliable and must be discarded and replaced with another ETCO₂ device.

Waveform devices detect a "tracheal waveform." If the tracheal waveform is not detected, incorrect tube placement has likely occurred. The tube must be removed and intubation may be reattempted if indicated.

If an intubated patient without pulses regains pulses during resuscitation, an ETCO₂ device should be placed as soon as practicable.

ADULT INTUBATION SKILLS DEMONSTRATION

NAME _____

DATE _____

EVALUATOR

SKILL DEMONSTRATION	SKILL COMPLETION CRITERIA	_
Patient Assessment	<ul style="list-style-type: none"> - Checks airway and breathing <ul style="list-style-type: none"> · looks, listens, and feels · assures adequate BLS airway 	
Insert Oropharyngeal Airway	<ul style="list-style-type: none"> - Demonstrates proper sizing technique <ul style="list-style-type: none"> · angle of jaw to corner of mouth, or · angle of jaw to central incisor - Demonstrates proper insertion technique 	
Insert Nasopharyngeal Airway	<ul style="list-style-type: none"> - Demonstrates proper sizing technique <ul style="list-style-type: none"> · angle of jaw to nares · states lubrication - Demonstrates proper insertion 	
Bag-Valve-Mask w/ O ₂ Reservoir	<ul style="list-style-type: none"> - Demonstrates proper technique <ul style="list-style-type: none"> · obtains good seal · proper head position · ventilates at appropriate rate 	
Oral Endotracheal Intubation · Checks Equipment and Prepares Patient	<ul style="list-style-type: none"> - States indications and contraindications <ul style="list-style-type: none"> · discusses drug administration (which drug, volume) - States how tube size is determined and chooses appropriate size tube - Checks equipment <ul style="list-style-type: none"> · assembles laryngoscope and checks light · inflates and checks cuff · inserts and secures stylet (end must not protrude beyond tip of ETT) · states would lubricate tip of ETT - Positions mannequin properly (sniffing position) - Demonstrates hyperventilation of patient with BVM device prior to intubating 	
· Proper Laryngoscope Insertion	<ul style="list-style-type: none"> - Demonstrates proper insertion <ul style="list-style-type: none"> · advances blade into right side of mouth, sweeping tongue to left · upward motion of handle at 45 degree angle until glottic opening visualized, discusses not using teeth as a fulcrum · discusses placement for both curved (into vallecula) and straight blades (below epiglottis) 	

<ul style="list-style-type: none"> · Visualization of Vocal Cords 	<ul style="list-style-type: none"> - Verbalizes landmarks <ul style="list-style-type: none"> · states visualization of cords 	
<ul style="list-style-type: none"> · Placement of Endotracheal Tube 	<ul style="list-style-type: none"> - Verbalizes visualization through cords <ul style="list-style-type: none"> · advances cuff 2-3 cm past cords · removes blade while maintaining tube position 	
<ul style="list-style-type: none"> · Assesses Placement of ETT 	<ul style="list-style-type: none"> - Checks tube placement with esophageal intubation detection bulb, and discusses why used - Uses end-tidal CO2 detector if patient has pulse - Ventilates mannequin <ul style="list-style-type: none"> · inflates cuff until no air leak · auscultates lungs bilaterally at 2 sites · observes for chest rise and condensation in tube · auscultates over epigastrium 	
<ul style="list-style-type: none"> · Secures ETT 	<ul style="list-style-type: none"> - Demonstrates using tape or tube holder <ul style="list-style-type: none"> · discusses cm mark at lips 	
<ul style="list-style-type: none"> · Reassesses Patient 	<ul style="list-style-type: none"> - Discusses circumstances when reassessment is essential, and methods used, including esophageal intubation detection bulb <ul style="list-style-type: none"> · after critical interventions (suctioning, instillation of medications) · after moving patient · upon loading/unloading 	

PEDIATRIC INTUBATION SKILLS DEMONSTRATION

NAME _____ DATE _____

EVALUATOR

SKILL DEMONSTRATION	SKILL COMPLETION CRITERIA	—
Patient Assessment	<ul style="list-style-type: none"> - Checks airway and breathing <ul style="list-style-type: none"> · looks, listens, and feels · assures adequate BLS airway 	
Insert Oropharyngeal Airway	<ul style="list-style-type: none"> - Demonstrates proper sizing technique <ul style="list-style-type: none"> · angle of jaw to corner of mouth, or · angle of jaw to central incisor - Demonstrates proper insertion technique 	
Insert Nasopharyngeal Airway	<ul style="list-style-type: none"> - Demonstrates proper sizing technique <ul style="list-style-type: none"> · angle of jaw to nares · states lubrication - Demonstrates proper insertion 	
Bag-Valve-Mask w/ O ₂ Reservoir	<ul style="list-style-type: none"> - Demonstrates proper technique <ul style="list-style-type: none"> · obtains good seal · proper head position · ventilates at appropriate rate 	
Oral Endotracheal Intubation · Checks equipment and prepares patient	<ul style="list-style-type: none"> - States indications and contraindications <ul style="list-style-type: none"> · discusses drug administration (which drug, volume) - States how tube size determined and chooses appropriate size tube - Checks equipment <ul style="list-style-type: none"> · assembles laryngoscope and checks light · inflates and checks cuff, if appropriate · inserts and secures stylet (end must not protrude beyond tip of ETT) · states would lubricate tip of ETT - Positions mannequin properly (sniffing position) - Demonstrates hyperventilation of patient with BVM device prior to intubating 	
· Proper Laryngoscope Insertion	<ul style="list-style-type: none"> - Demonstrates proper insertion <ul style="list-style-type: none"> · advances blade into right side of mouth, sweeping tongue to left · upward motion of handle at 45 degree angle until glottic opening visualized, discusses not using teeth as a fulcrum · discusses placement for both curved (into vallecula) and straight blades (below epiglottis) 	

· Visualization of Vocal Cords	- Verbalizes landmarks · states visualization of cords	
· Placement of Endotracheal Tube	- Verbalizes visualization through cords · advances tube 1/2 - 1 cm past cords · removes blade while maintaining tube position	
· Assesses Placement of ETT	- Checks tube placement with esophageal intubation detection bulb, and discusses why used - Uses end-tidal CO2 detector if patient has pulse - Ventilates mannequin · auscultates lungs bilaterally at 2 sites · observes for chest rise and condensation in tube · auscultates over epigastrium	
· Secures ETT	- Demonstrates using tape or tube holder · discusses cm mark at lips	
· Reassesses Patient	- Discusses circumstances when reassessment is essential, and methods used, including esophageal intubation detection bulb · after critical interventions (suctioning, instillation of medications) · after moving patient · upon loading/unloading	

Station Completion Criteria:

Student correctly performs, in proper sequence, all identified critical performance steps. The endotracheal tube must be in the trachea when inspected by the evaluator.

IN-LINE C-SPINE INTUBATION SKILLS DEMONSTRATION

NAME _____

DATE _____

EVALUATOR _____

SKILL DEMONSTRATION	SKILL COMPLETION CRITERIA	_
Patient Assessment	<ul style="list-style-type: none"> - Checks airway and breathing <ul style="list-style-type: none"> · looks, listens, and feels · assures adequate BLS airway while maintaining head in an in-line neutral position - Directs assistant in control of patient head for intubation: hands over ears, fingers under the occiput with thumbs pressing over the maxillary sinuses. Instructs assistant to exert slight pressure to prevent hyperextension during intubation 	
In-line Oral Endotracheal Intubation · Checks equipment and prepares patient	<ul style="list-style-type: none"> - States indications and contraindications - States how tube size is determined and chooses appropriate size tube - Checks equipment <ul style="list-style-type: none"> · assembles laryngoscope and checks light · inflates and checks cuff · inserts and secures stylet (end must not protrude beyond tip of ETT) · states would lubricate tip of ETT - Positions self and mannequin properly: sits on ground and secures patient head between thighs, or lies prone at patient's head, insuring that hyperextension of the neck does not occur - Demonstrates hyperventilation of patient with BVM device prior to intubating 	
· Proper Laryngoscope Insertion	<ul style="list-style-type: none"> - Demonstrates proper insertion <ul style="list-style-type: none"> · advances blade into right side of mouth, sweeping tongue to left · upward motion of handle at 45 degree angle until glottic opening visualized, discusses not using teeth as a fulcrum · discusses placement for both curved (into vallecula) and straight blades (below epiglottis) 	
· Visualization of Vocal Cords	<ul style="list-style-type: none"> - Verbalizes landmarks <ul style="list-style-type: none"> · states visualization of cords 	
· Placement of Endotracheal Tube	<ul style="list-style-type: none"> - Verbalizes visualization through cords <ul style="list-style-type: none"> · advances tube 1 - 2.5 cm past cords · removes blade while maintaining tube position 	

<ul style="list-style-type: none"> · Assesses Placement of ETT 	<ul style="list-style-type: none"> - Checks tube placement with esophageal intubation detection bulb, and discusses why used - Uses end-tidal CO2 detector if patient has pulse - Ventilates mannequin <ul style="list-style-type: none"> · auscultates lungs bilaterally at 2 sites · observes for chest rise and condensation in tube · auscultates over epigastrium 	
<ul style="list-style-type: none"> · Secures ETT 	<ul style="list-style-type: none"> - Demonstrates using tape or tube holder <ul style="list-style-type: none"> · discusses cm mark at lips 	
<ul style="list-style-type: none"> · Reassesses Patient 	<ul style="list-style-type: none"> - Discusses circumstances when reassessment is essential, and methods used, including esophageal intubation detection bulb <ul style="list-style-type: none"> · after critical interventions (suctioning, instillation of medications) · after moving patient · upon loading/unloading 	

Station Completion Criteria:

Student correctly performs, in proper sequence, all identified critical performance steps. The endotracheal tube must be in the trachea when inspected by the evaluator. Student is responsible for maintenance of constant C-spine immobilization.

**CONTRA COSTA COUNTY
EMERGENCY MEDICAL SERVICES**

INTUBATION MODULE SKILLS STATIONS

Name: _____ Date: _____

Station 1: Adult Endotracheal Intubation

PASS FAIL

Signature

Station 2: Pediatric Endotracheal Intubation

PASS FAIL

Signature

Station 3: In-line C-spine Immobilization Endotracheal Intubation

PASS FAIL

Signature

Retest: Station # _____

PASS FAIL

Signature

Retest: Station # _____

PASS FAIL

Signature

Retest: Station # _____

PASS FAIL

Signature

Course Director

Date

**THIS FORM MUST BE COMPLETED PRIOR TO RECEIVING
A COURSE COMPLETION CERTIFICATE**

Name: _____

Post Test

1. For the apneic or near apneic patient, in general, it is better to skip BLS maneuvers and proceed with intubation.
True False
2. The airway in the pediatric patient is more anterior and cephalad than in the adult.
True False
3. In patients less than 8 years old, which part of the airway is more narrow?
A. Glottic opening
B. Trachea
C. Cricoid cartilage
D. Vocal cords
4. In an adult, to properly size an oral-pharyngeal airway, measure the distance from the central incisor to the angle of the jaw.
True False
5. You have a 2 year old child requiring intubation. What size tube would you select?
A. 3.5mm
B. 4.0mm
C. 4.5mm
D. Use Broselow tape to estimate tube size
6. The proper way to check for positioning of an endotracheal tube following placement is:
A. Using the esophageal detection bulb
B. Using an end-tidal CO₂ detector
C. Physical examination
D. Use all three techniques in combination (CO₂ detector if patient has a pulse).
7. If tube placement is in doubt, leave it in and have the E.D. physician check it.
True False
8. Intubation should be preceded by oxygenation of the lungs by other methods of ventilation.
True False
9. Insertion of an OPA that is too small may cause obstruction of the airway by the tongue.
True False
10. A straight laryngoscope blade is designed to fit in the vallecula.
True False



1 ☐ **Contra Costa EMS Agency**
Intubation Refresher Module

2 ☐ **Objectives**

- **Identify indications for intubation**
- **Review:**
 - **Challenging areas**
 - **Procedures for confirmation of intubation**
 - **Pediatric airway management**
 - **Stomal intubation, Combitube**

3 ☐ **Objectives**

- **Demonstrate:**
 - **Adult and pediatric intubation procedures**
 - **In-line intubation of patients with cervical spine immobilization**

4 ☐ **Course Content**

- **Video presentation**
 - **Lecture**
 - **Airway-Cam video**
- **Demonstration / Skills Testing**

5 ☐ **Intubation - Rationale**

- **To secure airway**
- **To deliver ventilation and oxygen**
- **To suction secretions**
- **To deliver drugs**

6 ☐ **Intubation - Approaches**

- **Orotracheal intubation**
- **Nasotracheal intubation - not authorized in Contra Costa**
- **Stomal intubation - through existing tracheostomy stoma**

7 ☐ **Indications - Adult**

- Medical or traumatic cardiac or respiratory arrest
- Respiratory rate of 6 or less
- Adults with severe respiratory distress or ineffective respirations

8 ☐ **Medical Control**

- Indications listed do not require base contact for adult patients – any other indications do require it
- Base contact required for pediatrics for patients with severe respiratory distress or ineffective respirations

9 ☐ **Special Considerations**

- Intubation or any other airway management should not delay defibrillation of patients
- Attention to potential cervical spine injury is paramount in patients with history of trauma

10 ☐ **Intubation in Severe Respiratory Distress**

- More complex decision-making process
- Knowing when to intubate is more an issue than how to intubate

11 ☐ **Severe Respiratory Distress**

- Causes:
 - Severe asthma/COPD
 - Severe pulmonary edema

12 ☐ **Severe Respiratory Distress**

- Respiratory failure from pneumonia, tumor, or pleural effusion
- Obstructive lesions: abscesses or tumors in upper or lower airway

13 ☐ **Severe Respiratory Distress**

- Trauma (pneumothorax, severe lung contusion, bronchial tears, or cardiac trauma)
- Conditions with altered LOC and inability to protect airway (e.g. injuries, tumors, toxins, infection)

14 ☐ **Severe Respiratory Distress**

- Careful assessment is essential to make good decisions about intubation for respiratory distress.
- Contact base if any question

15 ☐ **Severe Respiratory Distress**

- Assessment
 - Respiratory rate
 - Respiratory effort
 - Level of consciousness
 - Other signs

16 ☐ **Respiratory Rate**

- Be prepared to intubate if adult patient's respiratory rate is very rapid (over 40/minute) or if rate inappropriately slow

17 ☐ **Respiratory Effort**

- Clues to level of distress include:
 - Marked use of accessory muscles
 - Ineffective, shallow, or agonal (gaspings) respirations

18 ☐ **Level of Consciousness**

- Decreased LOC as a result of respiratory distress or hypercarbia
- Agitation may be a sign of significant hypoxemia

19 ☐ **Signs of Impending Doom**

- Incontinence of urine or stool in setting of respiratory distress
- Sudden or steady decrease in respiratory effort or level of consciousness

20 ☐ **Contraindications**

- Isolated medical respiratory arrest with suspected narcotic overdose or hypoglycemia
- Maxillofacial trauma with unrecognizable facial landmarks

21 ☐ **Contraindications**

- Patients experiencing seizures
- Patients with an active gag reflex

22 ☐ **Seizures**

- Treatment with diazepam or midazolam may lead to need for respiratory support and potential need for intubation
- Assistance with BVM may be all that is needed

23 ☐ **Active Gag Reflex**

- Some patients need intubation, airway protection despite presence of gag reflex
- As they worsen, gag reflex will diminish and intubation may be possible

24 ☐ **Problem Intubations**

- Patients with short necks, receding chin, or limited mouth opening

- Patients with limited neck mobility (from arthritis or injury)
- Some are impossible to intubate because of anatomical factors

25 ☐ **Equipment**

- Functioning laryngoscope, blade
- Functioning ET tube with intact cuff
- Stylet
- Suction
- Oropharyngeal airway or bite block
- Tape or tube holder

26 ☐ **Equipment**

- Sterile lubricant
- Protective eyewear and gloves
- Magill forceps for FB removal
- Esophageal detection device (Tube-ChekB) for all intubations
- End-tidal CO₂ indicator (for use in patients with perfusing pulses)

27 ☐ **Technique**

- IF YOU DON'T KNOW IT BY NOW, YOU'RE IN TROUBLE

28 ☐

29 ☐

30 ☐ **Technique**

- Do not prolong intubation attempts more than 30 seconds
- Cricoid pressure (Sellick maneuver) may help prevent regurgitation and aspiration

31 ☐

32 ☐ **Confirming Intubation**

- After cuff inflation, compress esophageal detection bulb fully, attach to ET tube, and release bulb (Not to be used on patients less than 20 kg)
- Bulb should reinflate within 1-2 seconds

- If bulb does not reinflate, esophageal intubation is likely

33 ☐

34 ☐ **Confirming Intubation**

- If patient not in cardiac arrest, attach ETCO₂ device. If no color change after several ventilations, extubate and repeat intubation
- Auscultate chest after confirmation with bulb (and ETCO₂ if applicable)

35 ☐ **Confirming Intubation**

- Observe chest rise for symmetric movement
- If chest does not rise, remove tube and reintubate
- Auscultate in left upper quadrant of abdomen - if air entry heard remove ET tube

36 ☐ **Confirming Intubation**

- In questionable cases, revisualize tube with laryngoscope or start over with basic airway management

37 ☐ **Securing ET tube**

- Use tape or tube holder
- Mark tube at level of lips
- Document your procedures fully, especially bulb and ETCO₂!

38 ☐

39 ☐ **Monitoring Placement**

- Re-evaluate after patient movement (TubeChek and breath sounds)
- Utilize ETCO₂ device for patients with perfusing pulse

40 ☐

41 ☐ **ETCO₂ Device**

- Patients without perfusing pulse may have low or non-detectable CO₂ levels - device may mislead
- Change in status (no CO₂ detected) means tube dislodged or patient no longer perfusing - reintubation necessary if tube dislodged

42 ☐ **Complications**

- Trauma (teeth, airway, tongue)
- Aspiration
- Hypoxia (prolonged attempt)
- Hypoventilation - if inadequate ventilation after intubation

43 ☐ **Complications**

- Arrhythmia
 - Catecholamine-induced tachycardia or ventricular arrhythmia (PVC's)
 - Vagal stimulation leading to bradycardia (particularly common in infants/children)

44 ☐ **Complications**

- Esophageal intubation
 - Can mean death or significant disability from hypoxia
 - Consistent use of bulb and ETCO₂ guard against this (physical exam helpful but less reliable than devices)

45 ☐ **Complications**

- Increased intracranial pressure in patients with trauma or bleed
 - Lidocaine blunts intracranial hypertensive response
 - No studies proving better outcome if lidocaine used (not currently in our procedure)

46 ☐ **Complications**

- **Pneumothorax**
 - from pre-existing injury or condition, worsened with ventilation after intubation
 - from trauma during intubation
 - from high pressure ventilation

47 ☐ **Complications**

- **Tube dislodgment**
 - One of the most common causes of esophageal tubes
 - Vigilant monitoring: ETCO₂ must be visualized in patient with pulse
 - Pulse oximetry also provides clue

48 ☐ **Complications**

- **Tube dislodgment**
 - Uncuffed tubes particularly prone to dislodgment
 - Re-check after patient movement
 - Consider cervical spine immobilization

49 ☐ **Pediatric Intubation**

50 ☐ **Pediatric Intubation Study**

- Showed no improved outcome when pediatric patients intubated
- Kids with respiratory arrest, foreign body, reactive airway disease did no better with ETT

51 ☐ **Pediatric Intubation Study**

- Frequent incidence of complications, including tube dislodgment
- Incidence of aspiration not different between intubated and non-intubated

52 ☐ **Pediatric Intubation Study**

- Intubation didn't help, may harm

- If airway can be managed with BLS maneuvers, there may be no advantage to intubation
- Intubate if can't maintain BLS, if access needed for medications

53 ☐ **BLS Airway Management**

- Avoid rapid ventilation
 - Squeeze, release, release technique allows for adequate exhalation between ventilations, lessens gastric distention

54 ☐ **BLS Airway Management**

- Rate 20/min. for children > 1 y.o.
- Rate 30/min. for children < 1 y.o.
- Rate 40-60/min. for neonates

55 ☐ **Pediatric Assessment**

- Recognition of respiratory distress and respiratory failure is probably more crucial than the choice of treatment (BVM vs. intubation)
- Rapid transportation of children is essential -intubation lengthens scene time

56 ☐ **Pediatric Intubation and Medical Control**

- As standing order:
 - Children with medical or traumatic arrest
 - Respiratory rate of 6 or less
- Base contact required:
 - All other situations

57 ☐ **Pediatric Anatomy**

- Differences from adult:
 - Head larger proportionally, meaning head more in sniffing position when lying supine

– Positioning may be aided with towel under shoulders (rather than behind head)

58 **Pediatric Anatomy**

– Teeth more easily dislodged

– Tonsils larger

– Tongue larger, more difficult to move anteriorly (easier with straight blade)

59 **Pediatric Anatomy**

– Larynx more superior/anterior - alignment of axes without marked extension of head on neck

– Epiglottis “floppier”, may fold down (mainly kids <8)- straight blade better in those children

60 **Pediatric Anatomy**

– Cricoid ring area narrowest part of airway– use uncuffed tube under age 8

– Distance from glottic opening to carina is 5-7 cm - bronchus intubation may occur more easily

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65 **Pediatric ET Tubes**

• Cuffed tubes size 6 or above for use in children above age 8

• Marks for vocal cords in children (double black line or black tube)

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67 ☐ **Tube Selection in Children**

- Broselow tape indicates size
- Alternate method - $\frac{\text{age} + 16}{4}$
- Little finger diameter

68 ☐ **Tube Selection in Children**

- Most newborns - 3.0 mm tube
- Most 4-6 month olds - 3.5 mm tube
- Most 1-2 year olds - 4.0 mm tube

69 ☐ **Tube Selection in Children**

- Given variance, best to have one size larger and smaller available
- Small air leak acceptable in uncuffed tubes - tight fit may cause necrosis in cricoid cartilage area

70 ☐ **Tube Selection in Children**

- Pass double black line or black part of tube just past vocal cords
- Inability to pass tubes past cords likely means cricoid narrowing is limiting - use smaller tube

71 ☐ **Choice of Laryngoscope Blade In Children**

- Straight blade preferable in infants - it more easily displaces large tongue into floor of mouth
- Curved blades may be easier in children approaching adult size

72 ☐

73 ☐ **Choice of Laryngoscope Blade in Children**

- Broselow tape should be used
- Miller 0 for preemies
- Miller 1 for newborns and first year
- Miller 1-2 in children 1-2
- Curved blades size 2-3 commonly available for children 5 and older

74 ☐ **Pediatric ETCO₂ Detectors**

- Adult detector should be used only for short periods of time because of relative large amount of dead space
- Special pediatric ETCO₂ detectors can be used continuously

75 ☐

76 ☐ **Stomal Intubation**

- New Contra Costa County EMS procedure in 2000
- Allows intubation of patients via pre-existing tracheostomy

77 ☐ **Stomal Intubation - Indications**

- Respiratory Arrest
- Hypoventilation
- Loss of gag reflex

78 ☐ **Stomal Intubation - Technique**

- Choose tube size-largest size that will fit through stoma without force
- Check cuff, ready suction device
- Position patient, suction if necessary

79 ☐ **Stomal Intubation - Technique**

- Insert tube through stoma
- Advance tube until cuff just inside the stoma

- Insert air into cuff to prevent air leak

80 ☐ **Stomal Intubation - Technique**

- Ventilate, watch for chest rise
- Auscultate lungs and epigastrium
- Apply end-tidal CO₂ detector on patients with pulses
- Secure tube

81 ☐ **Stomal Intubation**

- Re-evaluate position of tube with each move of patient
- Tracheal length is only 10 cm from vocal cords to carina, so insertion of stomal tube can easily be too deep- insert only just beyond inside of stoma

82 ☐ **Combitube**

- Esophageal/Tracheal Double Lumen Airway (ETDLA)
- Will replace Esophageal Obturator Airway (planned training Fall 2001)
- More effective alternative than EOA (can use in non-arrest situations)

83 ☐

84 ☐ **Combitube**

- Can be used when endotracheal intubation is not possible
 - Obscured airway from vomit, blood, or other secretions
 - Maxillofacial trauma
 - Limited access to airway (entrapment)

85 ☐